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Environmental Assessment for the Development of the Energy Technology Proving Ground

November 2026

Idaho National Laboratory

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ACRONYMS

BEA	Battelle Energy Alliance
BLM	Bureau of Land Management
BMP	best management practice
BPP	Bat Protection Plan
CCA	Candidate Conservation Agreement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
DEQ	Department of Environmental Quality
DOE	U.S. Department of Energy
DRI	Direct Reduced Iron
EA	environmental assessment
EIL	Energy Innovation Laboratory
ESA	Endangered Species Act
ESL	Energy Systems Laboratory
FEC	facility emissions cap
GPD	gallons per day
IDFG	Idaho Department of Fish and Game
INL	Idaho National Laboratory
MPS	Modular Power Systems
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
OSHA	Occupational Safety and Health Administration
PG	
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
SGCA	Sage-Grouse Conservation Area
SHPO	State Historic Preservation Office
SMC	Specific Manufacturing Capability
SRPA	Snake River Plain Aquifer
SSER	Sagebrush Steppe Ecosystem Reserve
USFWS	United States Fish and Wildlife Service

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Environmental Assessment for the Development of the Energy Technology Proving Ground

1. INTRODUCTION

The U.S. Department of Energy (DOE)-sponsored the Idaho National Laboratory (INL) is the nation's leading research facility dedicated to advancing nuclear energy and integrating energy systems and related technologies. INL plays a critical role in supporting DOE's mission to drive scientific discovery and innovation in the energy and materials sectors. With its extensive expertise, available footprint, and strategic partnerships, INL is uniquely positioned to address national energy challenges and contribute to the development of abundant, reliable, and affordable energy systems.

DOE is supporting the development of the Energy Technology Proving Ground (Proving Ground) at INL to provide a flexible, integrated environment for research, development, testing, and demonstration activities. The Proving Ground is designed to include enabling infrastructure and a range of general-purpose research and support facilities designed to accommodate evolving mission needs. This approach aligns with DOE direction to expand capabilities for integrated testing environments and addresses the growing demand for facilities that can support both existing and emerging research activities.

The Proving Ground is intended to provide foundational infrastructure, such as roads, utilities, and support systems, along with general-purpose research facilities capable of supporting a wide range of research, development, and demonstration activities across multiple energy domains. These energy domains may include activities related to grid modernization and integrated energy systems; however, specific technologies, processes, and operations have not been defined and may evolve over time.

As a national leader in energy research, INL plays a central role in advancing DOE's mission to ensure national energy security and accelerate innovation in energy technologies. INL offers a unique research environment with specialized capabilities and facilities that support the development and deployment of advanced energy systems. Battelle Energy Alliance, LLC (BEA), serves as the management and operating contractor for INL and is responsible for ensuring the laboratory's performance in alignment with DOE objectives.

In accordance with DOE's National Environmental Policy Act (NEPA) implementing regulations at 10 Code of Federal Regulations (CFR) Part 1021, DOE has prepared this environmental assessment (EA) to evaluate the potential environmental impacts associated with the development of the Proving Ground. This EA analyzes the construction and operation of enabling infrastructure and general-purpose research facilities within a defined footprint at the INL Site. Facilities and associated activities are described at a conceptual level to establish a bounding envelope for environmental analysis; specific facility designs, technologies, and operational characteristics have not been defined. Depending on the outcome of this EA, DOE may (1) determine that the potential environmental impacts of the Proposed Action would be significant, in which case an Environmental Impact Statement would be prepared or (2) determine that a Finding of No Significant Impact is appropriate, allowing DOE to proceed without additional NEPA documentation.

1.1 Purpose and Need

The DOE, through the Energy and Environment Science and Technology directorate, has an ongoing need to provide modern, flexible, and scalable infrastructure and research facility capability to support evolving research requirements. As research and development activities advance, these efforts increasingly require co-located infrastructure, adaptable site configurations, and a range of facility types (e.g., laboratory, high-bay, test, and support facilities) that can accommodate changing technical needs over time. Existing facilities and dispersed infrastructure at INL are not always optimal to efficiently support these requirements.

The purpose of the Proposed Action is to develop and operate the Proving Ground at INL to provide enabling infrastructure and a range of research and support facilities that support current and enable future research, development, testing, and demonstration needs. These future facilities may include laboratory facilities, high-bay and large-scale test structures, research support buildings, data control modules, and outdoor test areas and pads. The Proving Ground would enhance INL's ability to efficiently site and support a range of activities by consolidating infrastructure and facility capability within a coordinated development area.

The need for the Proving Ground arises from an increasing demand for coordinated, flexible infrastructure and facility capability to support DOE programs and collaborations with industry and other stakeholders. Providing shared infrastructure (e.g., utilities, access roads, and pads) together with a range of research and support facilities would improve efficiency, reduce reliance on temporary or ad hoc solutions, and support long-term planning. Specific facility designs, technologies, and operational characteristics have not been defined and may evolve over time; therefore, this EA evaluates development at a programmatic, upper-bounding level.

1.2 Scope of the Environmental Assessment

This EA documents the Proposed Action and alternatives, describes the affected environment, evaluates the environmental consequences of implementing the Proposed Action, and references DOE's statutory obligations in accordance with DOE NEPA Implementing Procedure effective June 30, 2025, and subsequently revised February 2, 2026, and July 17, 2026. The analysis provides sufficient detail to support a determination of whether a Finding of No Significant Impact can be issued, or an Environmental Impact Statement is required.

This EA evaluates the potential environmental impacts associated with the development of enabling infrastructure and a range of research and support facilities within a defined footprint at INL. The Proposed Action includes site preparation and development activities such as grading, utility installation, construction of access roads, development of utility corridors, and establishment of general-purpose pads, along with construction of general-purpose research and support facilities.

The scope of this EA is limited to evaluating development at a programmatic, upper-bounding level. Facilities are described in terms of representative types (e.g., laboratory facilities, high-bay structures, test and support buildings, control and data computing modules, and outdoor test areas) to establish an upper bound for environmental analysis. Specific facility designs, technologies, processes, and operational characteristics have not been defined and are not evaluated in detail in this EA.

References to potential future uses of the Proving Ground are provided for context only. These uses are illustrative and do not represent specific proposals or decisions. No decision regarding the implementation of specific facility designs, technologies, or operations is made in this document.

The conceptual layout, planning assumptions, and facility descriptions presented in this EA are notional and are intended to inform bounding analysis only. These elements do not constitute a commitment to construct specific facilities or implement particular technologies.

Before implementation of any future project-specific proposal within the Proving Ground, including final facility design, technology selection, and operational details, DOE would evaluate whether the proposal is bound by the scope and impacts analyzed in this EA, as described in Section 2.1.5. Additional NEPA review would be conducted if the proposal falls outside those bounds.

2. ALTERNATIVES

This section describes the Proposed Action, the No Action Alternative, and alternatives considered but eliminated from further analysis. The DOE Idaho Operations Office (DOE-ID) evaluated reasonable alternatives to meet the need for providing enabling infrastructure and research facility capability to support current and future research, development, testing, and demonstration activities at INL.

For an alternative to be considered reasonable, it must satisfy the purpose and need for action by providing flexible, scalable, and coordinated infrastructure capability. In addition, alternatives were evaluated based on their ability to do the following:

- Be located within the INL Site to maintain compatibility with existing land use, infrastructure, and institutional controls supporting INL mission activities.
- Provide access to existing utilities, transportation networks, and support services necessary for infrastructure development.
- Support efficient, coordinated, and flexible infrastructure development within a defined footprint.
- Minimize environmental disturbance by using previously disturbed or operational areas, where practicable.
- Support the use of existing infrastructure and avoid unnecessary duplication or disruption of ongoing INL operations.

Based on these criteria and in coordination with INL Facility and Site Services organizations, DOE identified potential areas within the Central Facilities Area (CFA) and other operational areas of the INL Site that are suitable for development of enabling infrastructure and research facility capability to meet the purpose and need (see Figure 1, Figure 2, and Figure 3).

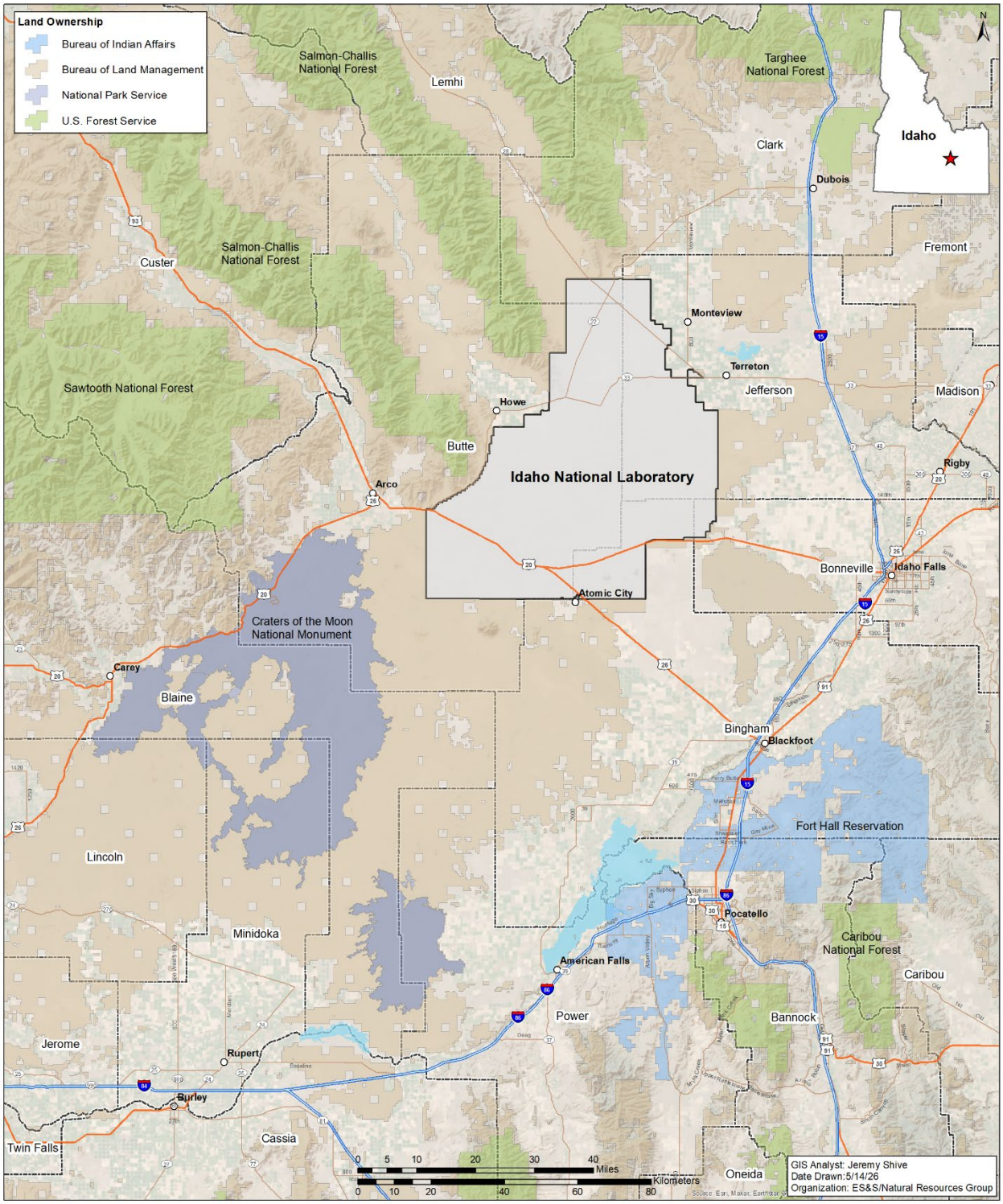


Figure 1. Site map of INL.

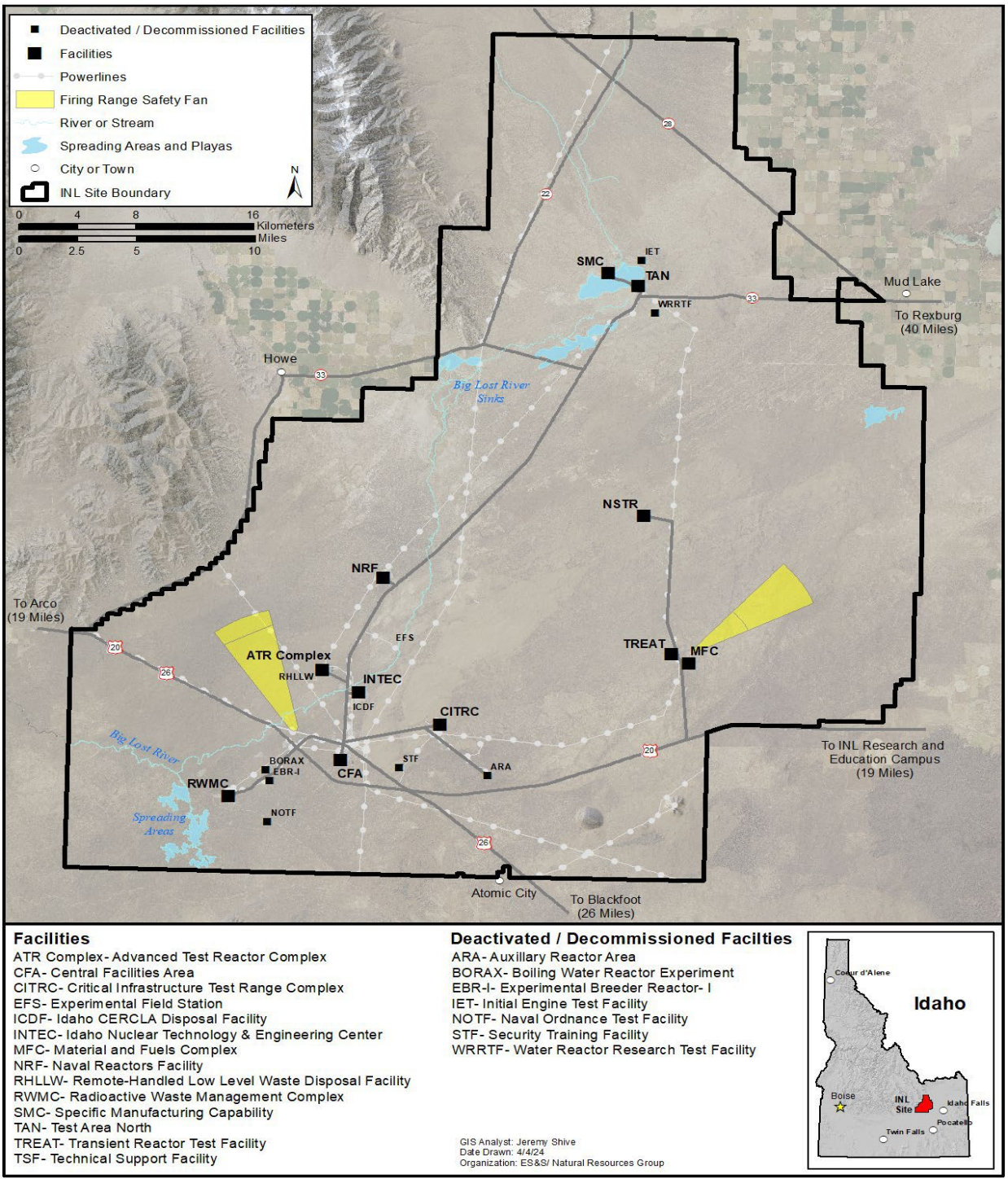


Figure 2. INL Site and facility locations.

2.1 Proposed Action

The Proposed Action includes the development of enabling infrastructure and a range of research and support facilities within the defined Proving Ground footprint, which would be located near the CFA, as shown in Figure 3 and Figure 4. Enabling infrastructure includes Site preparation, utility installation, access roads, general-purpose pads, and related support features necessary to accommodate development within the Proving Ground.

Facilities that may be developed under the Proposed Action include representative categories such as laboratory facilities, high-bay and large-scale test structures, research support buildings, control and data computing modules, and outdoor test areas and pads. Specific facility designs, technologies, processes, and operational characteristics have not been defined and may vary over time.

Implementation of the Proposed Action would involve typical construction activities associated with infrastructure and facility development. These activities may include land clearing and grubbing, grading and excavation, soil compaction, installation of erosion and sediment control measures, trenching for utility installation, placement of fill material, construction of access roads and circulation routes, installation of underground and aboveground utilities, development of general-purpose pads and staging areas, and construction of buildings and supporting structures. Construction activities would occur in phases based on funding availability and mission needs and would be conducted in accordance with applicable INL and DOE standards and environmental protection requirements.

Infrastructure developed under the Proposed Action may include electrical distribution systems, communications infrastructure, potable and fire-water systems, sanitary and wastewater lines including connections and systems, stormwater management features, natural gas distribution, and internal transportation networks. General-purpose pads and utility corridors would be established to support flexible development of the Site. These infrastructure elements provide foundational capabilities and do not represent authorization or commitment to specific facility designs, technologies, or operations.

Other than the Modular Power Systems (MPS) Testbed described later in this section, this EA does not authorize or evaluate specific facility designs, technologies, processes, or operations. References to potential future uses are illustrative only and do not represent specific proposals.

Under the Proposed Action, the Energy and Environment Science and Technology mission area would develop and operate enabling infrastructure and general-purpose research and support facilities within a designated operational area of the INL. The Proving Ground is intended to function as a flexible development platform that can accommodate a range of future activities as the mission needs evolve, while maintaining compliance with applicable safety, security, and environmental requirements.

The Proposed Action footprint is located within a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Institutional Control area, including CERCLA site ORD-3, the Naval Proving Ground impact area. Activities within ORD-3 are subject to applicable institutional controls established for CERCLA response actions at INL. These controls include surveys for unexploded ordnance (UXO) before beginning work. Prior to ground-disturbing activities or other field work within the institutional control boundary, project personnel would verify applicable requirements, coordinate with appropriate BEA Environmental/CERCLA personnel, complete required surveys or clearances, and implement any project-specific work controls required under the INL Sitewide Institutional Controls and Operations and Maintenance Plan for CERCLA Response Actions. The Proposed Action would be conducted in a manner that maintains the protectiveness of the CERCLA remedy and avoids uncontrolled or unpermitted releases of pre-existing hazardous substances, pollutants, or contaminants. Figure 3 and Figure 4 show the ORD-3 CERCLA site.

The Proposed Action includes construction and operation of an MPS Testbed to support a range of electrical and mechanical testing activities associated with grid infrastructure research. The MPS Testbed would consist of a graded and compacted test area integrated with associated electrical infrastructure, which may include power poles, distribution lines, mobile substations, and supporting equipment necessary to conduct testing activities. The MPS Testbed is described at a conceptual level to support bounding analysis; final configuration, components, and layout may vary.

For purposes of this EA, process operations with potential air emissions are bound by the operating assumptions and emissions envelope described in Section 3.3, Air Quality. Campaign process sources, including electric arc furnace operations, biomass combustor or gasifier operations, and test kiln operations, are evaluated at up to 2,000 operating hours per year. Continuous process loops and fugitive emission sources are evaluated at up to 8,760 operating hours per year where continuous operation provides the conservative emissions basis. Future equipment, operating schedules, throughput rates, or process configurations that would exceed the bounding assumptions in this EA would require additional review before implementation.

All activities conducted at the MPS Testbed would be subject to existing site infrastructure limitations and applicable regulatory requirements. Future test activities would be evaluated to ensure they are bound by the conditions analyzed in this EA; activities exceeding these bounds would require additional NEPA review.

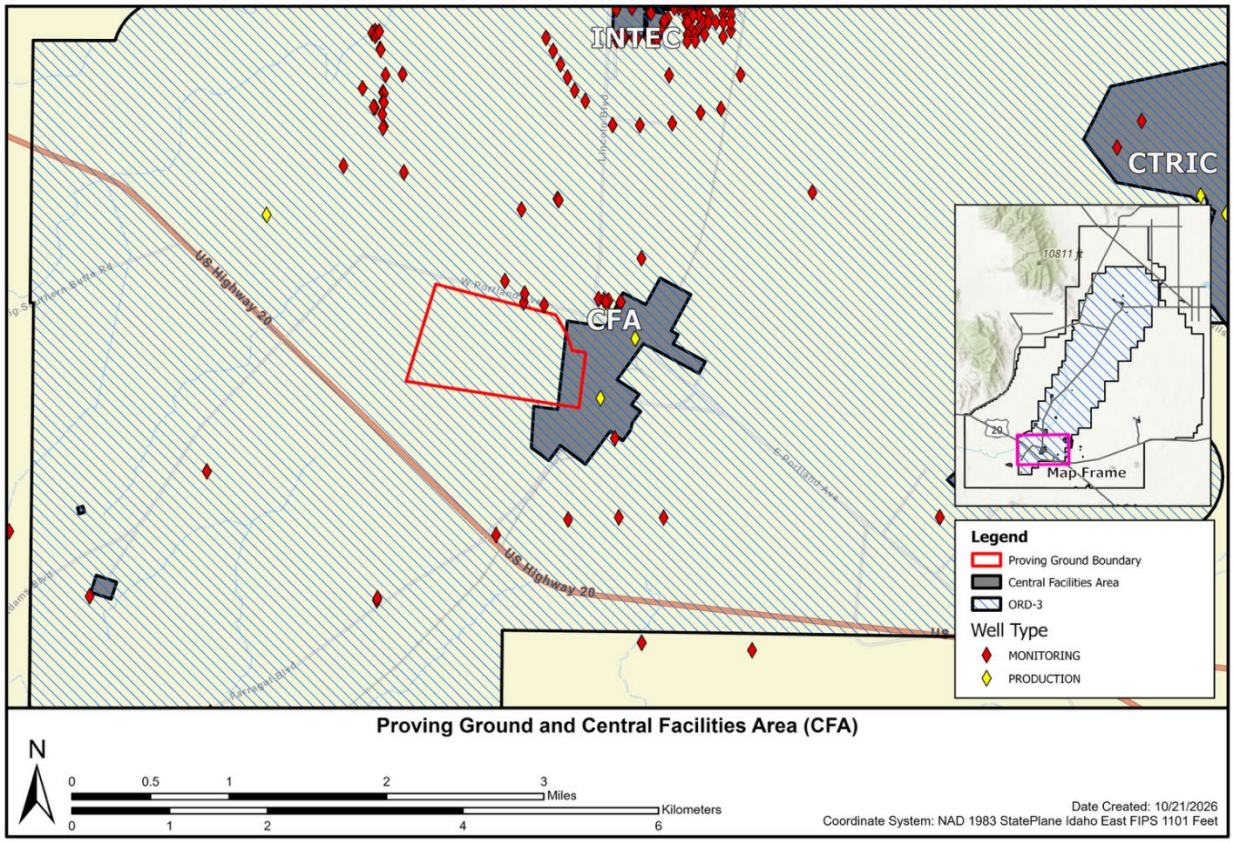


Figure 3. Proving Ground and Central Facilities Area.

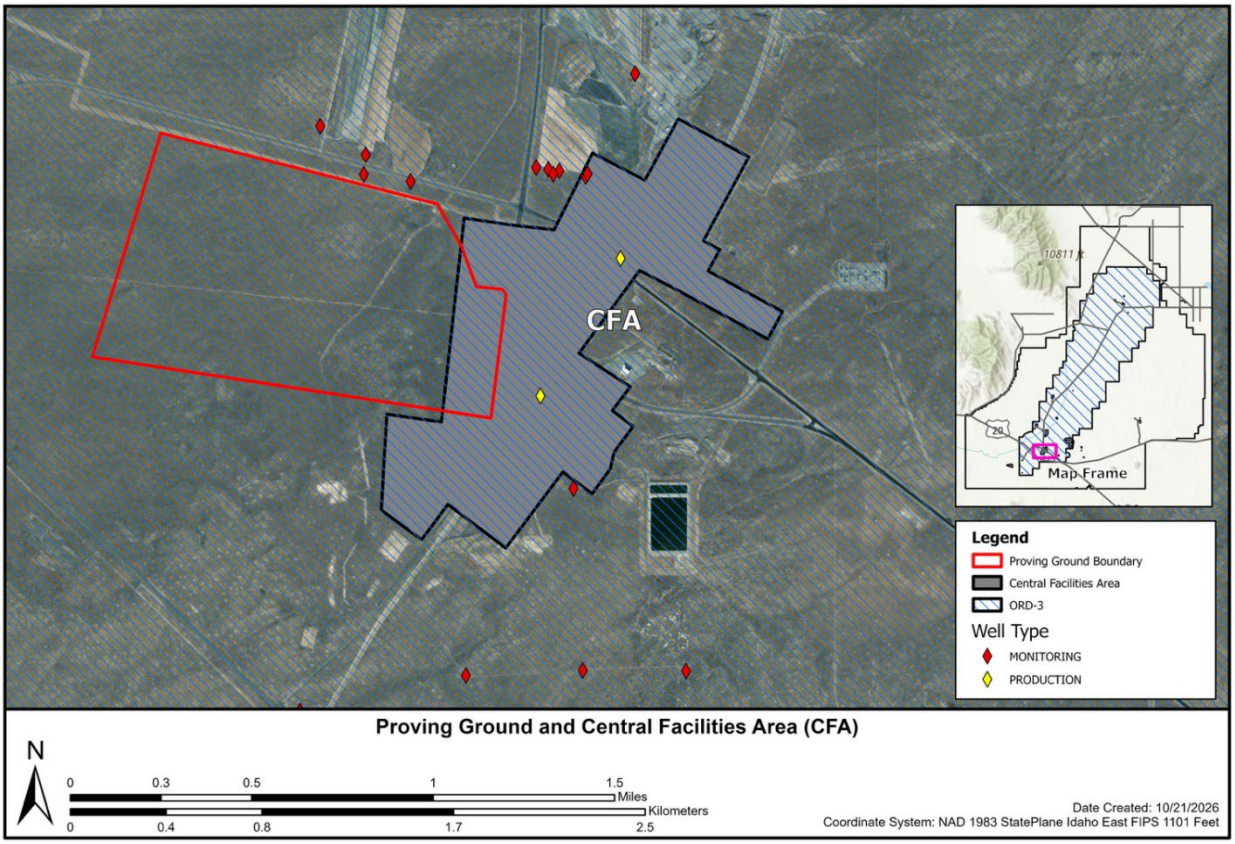


Figure 4. Proving Ground footprint boundary.

2.1.1 Proving Ground Assumptions

The layout presented in Figure 5 represents a planning-level configuration for development within the Proving Ground footprint. The layout identifies notional locations and general categories of enabling infrastructure as well as research and support facilities intended to accommodate potential future activities. The arrangement in Figure 6 shows approximately how infrastructure and facilities could be distributed within the Proving Ground boundary for planning and analytical purposes.

The configuration depicted in Figure 5 and Figure 6 is subject to refinement as design, funding, and mission requirements evolve. Specific locations, sizes, and configurations of infrastructure and facility elements may change during detailed design and implementation.

The Proposed Action evaluated in this EA encompasses the development of enabling infrastructure and a range of research and support facilities within the defined 383-acre footprint, including the general distribution shown in Figure 5. Other than the MPS Testbed, this EA does not authorize construction or operation of specific facility designs, technologies, processes, or operational activities that may be depicted or implied in the layout.

The assumptions described in this section are intended solely to support Proposed Action evaluation and to establish reasonable bounds for infrastructure and facility development. These assumptions do not represent commitments to construct specific facilities, implement defined research activities, or deploy technologies. Any future project-specific actions proposed within the Proving Ground would be subject to separate planning, environmental review, and decision-making, as appropriate.

2.1.2 Building and Infrastructure Footprints

The Proving Ground encompasses approximately 383 acres within a designated operational area of INL, as shown in Figure 5. This footprint represents the maximum geographic boundary within which enabling infrastructure and research and support facilities may be developed under the Proposed Action.

The campus layout illustrated in Figure 5 identifies potential buildings within the 383-acre footprint. These acreages represent notional, planning-level estimates of the potential extent of facility development used to establish a bounding envelope for environmental analysis. They do not constitute authorization of specific facility designs, technologies, or operations. The remaining acreage within the footprint would consist of access roads, open space, utility corridors, staging areas, outdoor test areas, and other support infrastructure necessary for Site functionality.

Development would occur in phases and remain confined to the 383-acre boundary evaluated in this EA. The timing, scale, and configuration of infrastructure and facility development would be driven by funding availability and evolving mission needs; however, no expansion beyond the identified footprint is authorized under the Proposed Action.

Development within the project footprint would convert previously undeveloped or disturbed land to laboratory-related uses. However, the vast majority of the INL Site would remain undeveloped.

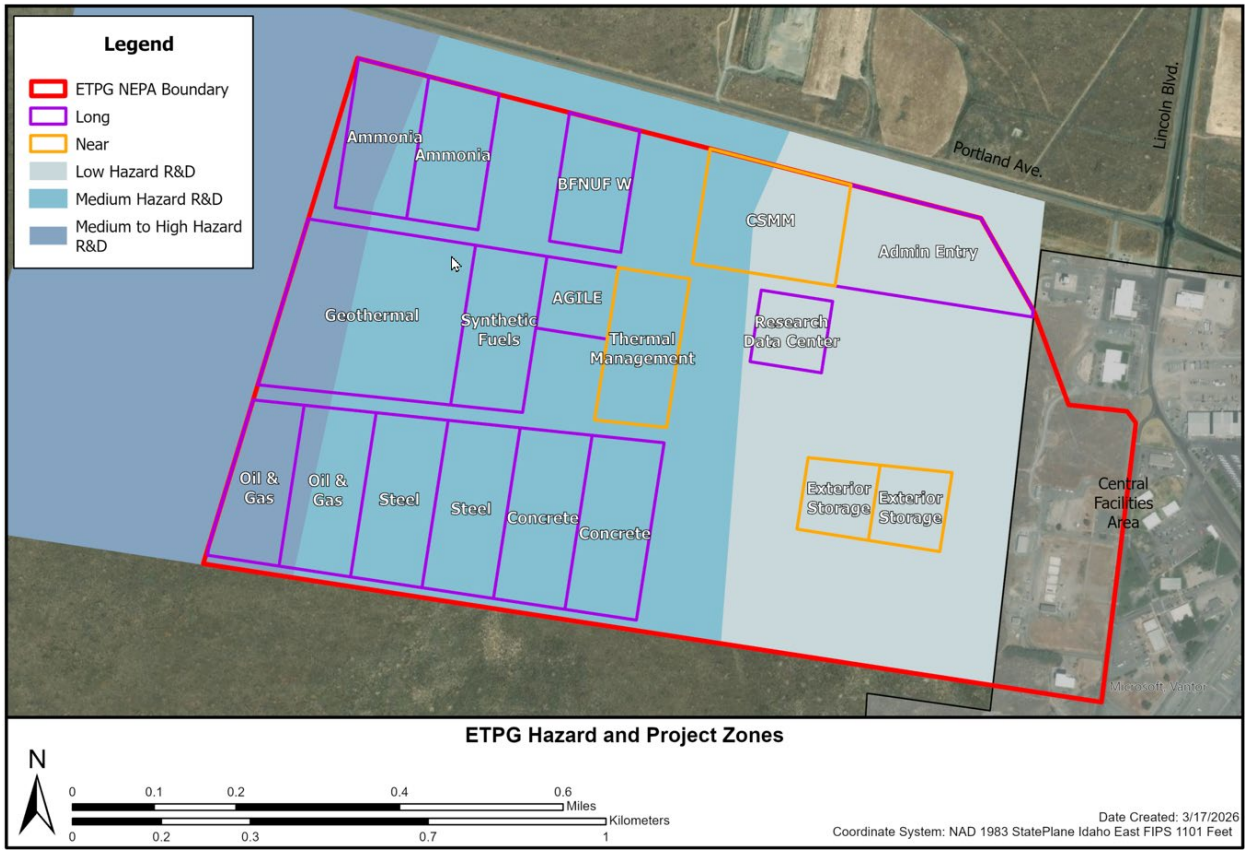


Figure 5. Proving Ground conceptual layout and hazard and project zones.

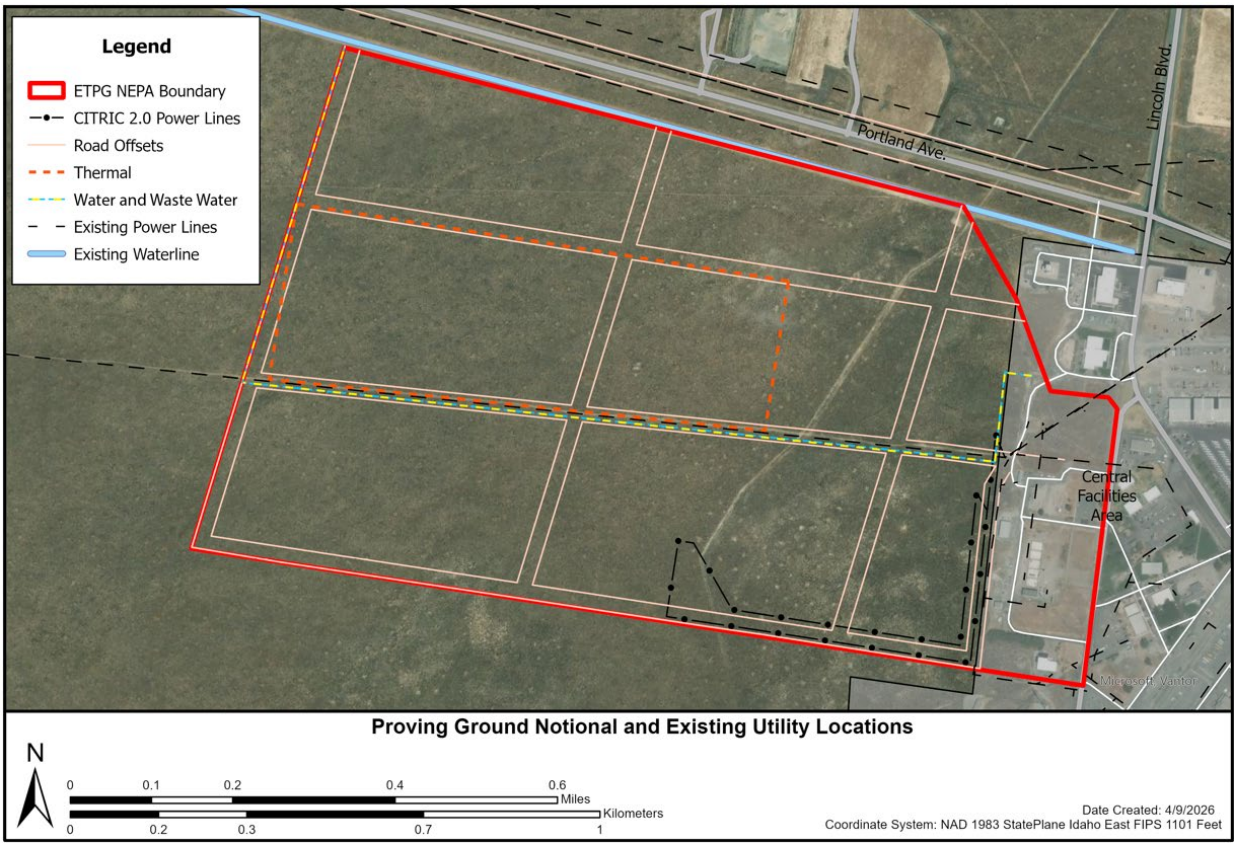


Figure 6. Notional Proving Ground and existing utility locations.

Testing conducted at the MPS Testbed may include conductor testing, high-current system evaluations, mechanical performance testing, and integration of distributed energy and control systems. The pad would be functionally integrated with adjacent pole infrastructure and electrical distribution system (see Figure 7 and Figure 8).

Operation of the MPS Testbed would generally be limited to intermittent, short-duration testing activities and would not involve continuous industrial operations. Testing would not include the use of explosives, open detonation, or other high-hazard activities requiring separate environmental reviews. No permanent structures, wastewater discharges, or routine air-emission sources would be established at the MPS Testbed.

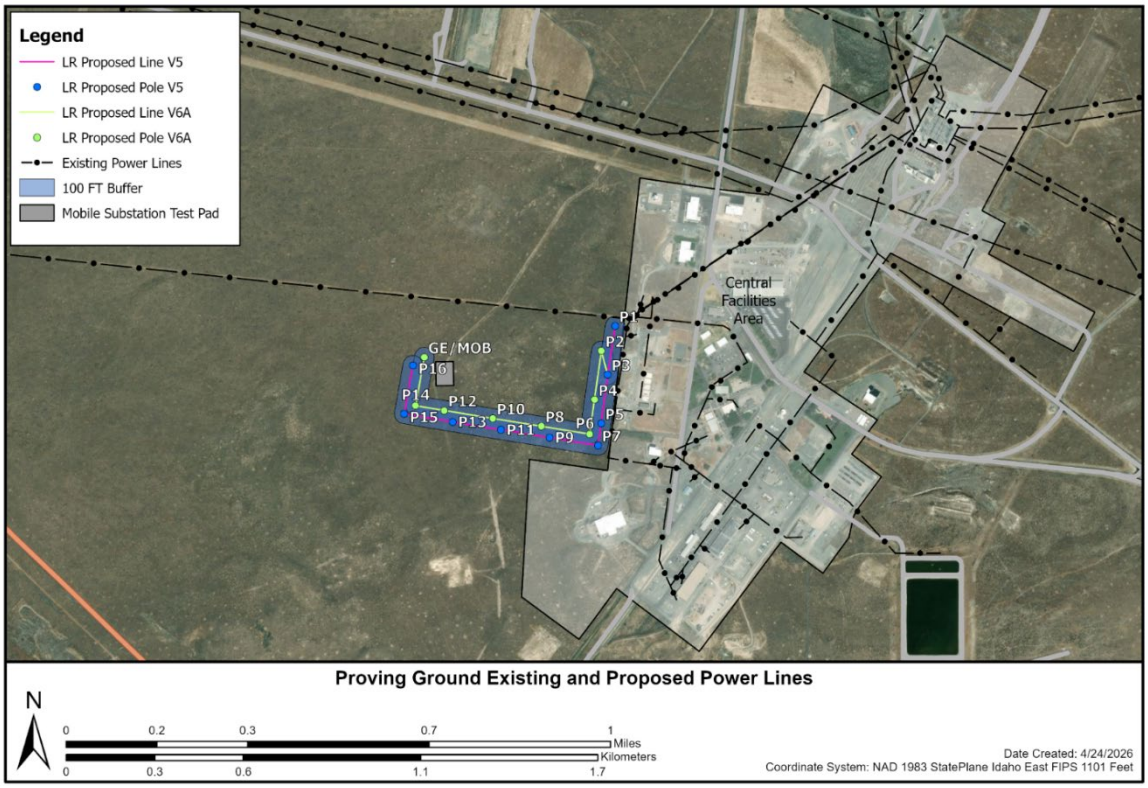


Figure 7. Existing Site area powerlines and proposed Proving Ground powerlines.

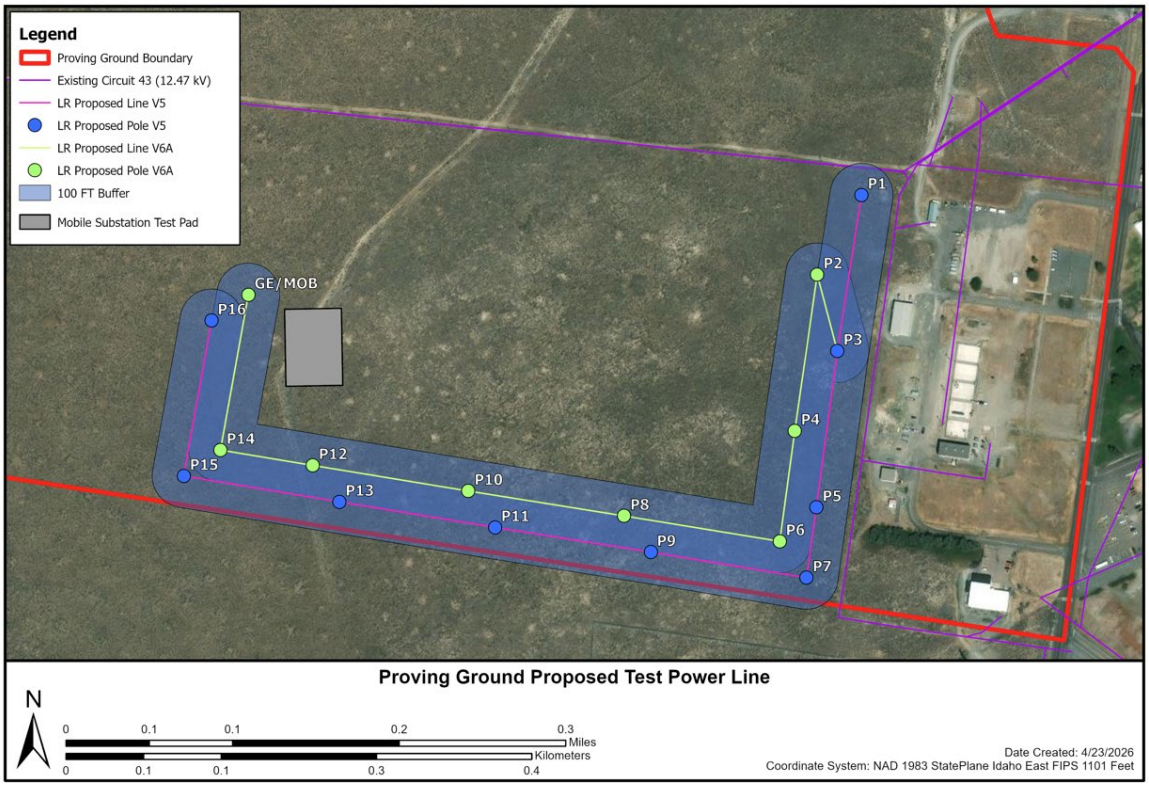


Figure 8. Proposed MPS Testbed powerlines.

2.1.3 Site Preparation

Site preparation activities for the Proving Ground would occur within the defined 383-acre footprint and would support phased development of enabling infrastructure and research and support facilities. Site preparation may include clearing and grubbing vegetation, grading, excavation, soil compaction, installation of erosion and sediment control measures, and preparation of building pads, test areas, and access routes. These activities would be implemented in accordance with established INL construction standards and environmental protection requirements.

Site preparation activities would be confined to areas necessary to accommodate infrastructure and facility development and may be sequenced in phases based on funding availability and mission requirements. Temporary erosion and sediment control measures would be implemented during construction to manage runoff and minimize disturbance outside the immediate work areas.

Existing surface features or minor site elements within the footprint may be adjusted, relocated, or removed as necessary to accommodate development; however, the Proposed Action does not include demolition of major facilities or preparation for installation of specific technologies or operational systems.

2.1.4 Representative Facility Types

The Proving Ground is intended to support a range of research, development, testing, and demonstration activities through the development of enabling infrastructure and a variety of research and support facilities. To support the evaluation of potential environmental impacts, representative facility types are described below at a conceptual level. These descriptions provide a bounding envelope for analysis and reflect the general types of facilities that may be developed within the Proving Ground footprint. Table 1 provides the projected number of facility types.

Energy Systems Research and Testing Facilities

Energy systems research and testing facilities would support the development, integration, and evaluation of advanced energy technologies, including systems associated with hydrogen and integrated energy applications. These facilities may include enclosed structures and outdoor test areas designed to accommodate pilot-scale or demonstration-scale systems and supporting equipment. Buildings would generally consist of industrial-type structures or high-bay spaces and may range from 100,000–150,000 square feet.

Materials Development and Processing Facilities

Materials development and processing facilities would support research, fabrication, and evaluation of materials used in advanced energy systems and related applications. These facilities may include laboratory space, light industrial areas, and high-bay processing areas designed to accommodate a variety of material preparation, handling, and testing activities. Buildings would typically be industrial or laboratory-type structures and may range from 50,000–100,000 square feet.

Laboratory and Analytical Facilities

Laboratory and analytical facilities would support scientific research, testing, and characterization activities. These facilities may include wet and dry laboratories, instrumentation space, and associated support areas. Laboratory facilities would generally be enclosed buildings designed to support a range of analytical and experimental functions and may range from 25,000 to 75,000 square feet.

High-Bay and Test Support Facilities

High-bay and test support facilities would provide flexible indoor space for assembly, staging, integration, and testing of equipment and systems. These facilities may include large, open-floor areas, overhead lifting systems, and infrastructure to support equipment and material handling. Structures would typically be industrial buildings and may range from 75,000–120,000 square feet.

Support and Administrative Facilities

Support and administrative facilities would provide office space, control rooms, maintenance areas, storage, and other functions necessary to support Proving Ground operations. These facilities may include administrative buildings, maintenance shops, warehouses, and utility support structures. Building sizes may vary widely depending on function but would generally range from 25,000–50,000 square feet.

Facilities described above represent generalized categories of development that could occur within the Proving Ground. Specific facility configurations, technologies, processes, and operational characteristics have not been defined and are not evaluated in detail in this EA. The descriptions are intended to establish a reasonable upper bound for environmental analysis and do not represent a commitment to construct specific facilities or implement technologies. Any future project-specific proposal would be subject to separate planning, environmental review, and decision-making, as appropriate.

2.1.5 Bounding Assumptions for Facility Development and Process Operations

2.1.5.1 Maximum Development Envelope for the Proposed Action

The Proposed Action would allow development of the Proving Ground within the Proposed Action area over a phased planning horizon. Because final facility designs, equipment vendors, facility layouts, and construction sequencing have not been fully determined, this EA evaluates a maximum reasonably foreseeable development envelope for the proposed facilities, infrastructure, and operations. This approach is intended to provide a conservative basis for evaluating environmental effects while preserving flexibility for final design, funding availability, mission needs, and future research requirements.

The maximum development envelope includes the proposed facility types, anticipated module counts, outdoor testing areas, utility infrastructure, process systems, storage areas, support infrastructure, construction activities, and operational capabilities described below. Actual development may occur in phases, and individual facilities may be smaller, less complex, or constructed later than assumed in this envelope. For purposes of this EA, however, the resource analyses evaluate the reasonably foreseeable maximum condition unless a resource-specific analysis uses a more conservative or more appropriate bounding assumption.

Before implementation of each future facility, testbed, process system, or major infrastructure component, DOE would evaluate whether the proposed activity is bound by the scope and impacts analyzed in this EA. Additional NEPA review, supplemental analysis, or other environmental review would be conducted if a future project would occur outside the Proposed Action area, would involve a materially different facility or process than described in this EA, would exceed the development or process-source assumptions analyzed in this EA, would introduce a new pollutant or waste stream not previously evaluated, or would result in environmental effects that are different from or greater than those analyzed in this EA.

2.1.5.2 General Facility and Infrastructure Envelope

The Proposed Action would include construction and operation of modular research, testing, laboratory, office, high-bay, support, and utility infrastructure. Based on the current modular structure inventory, the development envelope includes the buildings shown in Table 1.

Table 1. General facility and infrastructure envelope.

Facility/Module Type	Maximum Count Currently Identified	Approximate Module Dimensions	Approximate Footprint
High bays	11	112 ft × 80 ft	98,560 ft² total
Hangars	4	112 ft × 200 ft	89,600 ft² total
Laboratories	6	33 ft × 44 ft	8,712 ft² total
Office pods	21	36 ft × 40 ft	30,240 ft² total
Sprung structures	2	80 ft × 120 ft	19,200 ft² total
Command center	1	55 ft × 60 ft	3,300 ft² total
Concrete testing pads with utility connections	13	40 ft × 80 ft	41,600 ft² total
Grounded gravel pad	1	50 ft × 50 ft	2,500 ft² total
Battery/electrical storage unit	1	8 ft × 24 ft	192 ft² total
Bulk hydrogen storage unit	1	6 ft × 40 ft	240 ft² total

The preliminary modular inventory therefore includes approximately 249,612 ft² of enclosed or covered module footprint and approximately 44,532 ft² of outdoor pad, gravel pad, and containerized storage footprint, for a total preliminary modular/pad footprint of approximately 294,144 ft², or about 6.4 acres. These values do not include all roads, parking, fire lanes, laydown areas, stormwater controls, utility corridors, setbacks, fenced yards, substations, open test areas, or full facility parcels. The facility descriptions also identify larger facility parcels or outdoor areas beyond the modular footprints. For example, the Concrete Facility is expected to occupy approximately 20 acres, and the new substation/switchyard is also expected to occupy approximately 20 acres. The substation would include a control/operations building, fenced transformer and switchgear areas, and associated electrical equipment. Final resource analyses distinguish between building/module footprint and total disturbed or developed areas.

New buildings and structures would include high bays, hangars, laboratories, office pods, sprung structures, testing pads, storage units, command/control space, and utility support facilities. High bays are expected to accommodate heavy research equipment, overhead access, utility trenches, reinforced flooring, process skids, and bridge-crane or heavy-handling capabilities as needed. Hangars would support larger test assemblies, large equipment, and semi-conditioned or indirectly conditioned research space. Laboratories would support analytical, wet chemistry, separations, materials characterization, bench-scale verification, and related research functions. Office pods and the Training and Operations Facility would support research staff, visiting collaborators, control rooms, supervisory systems, training, and mission coordination.

The maximum structural envelope includes standard-height office and laboratory modules; high bays up to approximately 45 feet in total building height; hangar-type structures up to approximately 60 feet in total building height; and MPS Testbed poles up to approximately 90 feet tall. Exhaust stacks, process vents, communications equipment, and other vertical infrastructure would be evaluated during final design and would remain within the resource-specific assumptions analyzed in this EA or would require additional review.

2.1.5.3 Construction Envelope

Construction would occur in phases and may include site preparation, vegetation clearing, grading, excavation, trenching, utility installation, foundation work, road and parking construction, concrete pad construction, building erection, equipment delivery, process skid installation, electrical interconnection, stormwater controls, fencing, security infrastructure, and post-construction stabilization. Construction may also include temporary laydown yards, temporary parking, construction trailers, equipment staging, prefabricated module delivery, heavy-haul deliveries, crane operations, and installation of underground and aboveground utilities.

For resource-analysis purposes, the construction envelope should assume that construction activities could occur in multiple areas during the same general development period, although the entire Proving Ground would not be under active construction at one time. Construction sequencing would depend on mission need, funding, procurement, final design, permitting, utility availability, and safety requirements. Resource sections may use construction-phase assumptions such as maximum annual disturbed acreage, maximum simultaneous disturbed acreage, peak construction workforce, construction truck trips, heavy equipment mix, concrete delivery frequency, fugitive dust controls, stormwater best management practices (BMPs), and construction duration. Those numerical values should be inserted once confirmed by the project team.

Construction controls would include applicable erosion and sediment controls, fugitive dust controls, stormwater management, spill prevention, waste segregation, recycling where practicable, worker health and safety requirements, and post-construction stabilization or reclamation. Disturbed areas not needed for long-term operations would be stabilized or restored consistent with site requirements.

2.1.5.4 Utility and Infrastructure Envelope

The Proposed Action would include new and upgraded utility infrastructure to support research, testing, control, data, and process operations. Infrastructure may include potable and industrial water supply, fire-protection water, sanitary sewer or wastewater systems, process water systems, electrical distribution, substations, switchyards, communications duct banks, fiber, control systems, roads, parking, stormwater infrastructure, security fencing, lighting, compressed gas systems, hydrogen systems, CO_2 systems, nitrogen systems, and other utility corridors.

The proposed substation and switchyard would support increased electrical demand from research equipment and processes, improve reliability and power quality, and enable behind-the-meter integration of potential advanced energy sources. The substation would include a fenced yard containing transformers, switchgear, and related electrical equipment, plus a control/operations building.

The MPS Testbed would include up to 17 power poles, a grounded gravel pad, a mobile substation, and a high-current grid emulator. The testbed would support a 12.47-kV circuit, multiple ring-loop configurations, high-loading scenarios, energized and de-energized testing, fault testing, microgrid integration, large-load integration, robotic or drone installation testing, extreme-weather exposure studies, and possible fire-exposure studies.

2.1.5.5 Operational Envelope

Operations would consist of research, development, demonstration, testing, training, data collection, equipment validation, process integration, and support activities. Operations may occur during normal business hours or, for specific campaigns or integrated demonstrations, continuously or outside normal hours. Some facilities may operate intermittently, campaign-style, or at pilot scale, while others may operate as standing research infrastructure.

The operational envelope includes routine office and training functions; laboratory research; high-bay testing; outdoor pad testing; equipment staging; process skid operation; data computing research; grid and power systems testing; materials processing; energy systems integration; hydrogen handling; CO_2 handling; chemical and fuel synthesis research; ammonia and fertilizer process integration; critical-minerals extraction and separation research; concrete and cementitious materials research; hydrogen-based steel research; and supporting utility operations.

The Proposed Action evaluates **research, pilot-scale, demonstration-scale, and process-integration activities**, not unrestricted commercial production, unless commercial-scale production is specifically described and analyzed elsewhere in the EA. Future activities that would materially increase production scale, throughput, operating hours, storage inventories, emissions, waste generation, traffic, water demand, or hazardous material inventories beyond the assumptions analyzed in this EA would require additional review before implementation.

2.1.5.6 Process-Source Development Envelope

In addition to the general building envelope, this EA evaluates a process-source envelope because several Proving Ground facilities may include process equipment that generates emissions, waste, wastewater, hazardous material storage needs, or other resource-specific impacts. Table 2 shows the process-source envelope to include facility categories and maximum reasonably foreseeable capabilities.

Table 2. Maximum development facilities envelope.

PG Facility/Process Area	Maximum Development Envelope for EA Analysis
Critical Materials Facility	Mineral characterization laboratory; sample preparation room with dust control; wet chemistry and separations laboratory with fume hoods; large high bay for materials processing and pilot-scale extraction; crushing/grinding equipment such as ball mills with built-in HEPA filters; frothing equipment using frother chemical groups; and small quantities of cyanide.
Ammonia and Fertilizer Integration Facility	Integrated fertilizer (nitrogen, phosphorous, and potassium) research platform including biomass conversion through combustion and/or gasification; CO_2 capture, conditioning, and compression; high-temperature steam electrolysis hydrogen production or externally supplied hydrogen; air separation unit nitrogen supply; Haber-Bosch ammonia synthesis loop; urea synthesis and finishing; optional nitric acid production for ammonium nitrate pathways; heat exchangers, condensers, evaporation and crystallization systems; acid-resistant tanks; ash leaching/extraction; potassium and phosphorus recovery; solid handling and separation systems; recycle loops and purge handling.

PG Facility/Process Area	Maximum Development Envelope for EA Analysis
High-Temperature Hydrogen Production Facility	High-bay or hangar facility with supporting office space and an additional approximately 0.4 acre for modular testing pads and bulk hydrogen storage; commercial-scale high-temperature electrolysis systems greater than 1 megawatt; solid oxide electrolysis cells and associated balance-of-plant equipment; electrical and thermal energy inputs; hydrogen capture, conditioning, storage, and delivery systems; thermal energy capture, storage, conditioning, and utilization; co-electrolysis systems for producing syngas from carbon dioxide, steam, and hydrogen; and integration with gas turbines, solid oxide fuel cells, and downstream fuels, chemicals, and materials-production processes.
High-Temperature Electrochemistry Facility	High-bay facility with supporting laboratory and office space; pilot- through demonstration-scale electrochemical processing, electrocatalysis, materials-testing, and cell/stack-testing systems; solid oxide electrolysis cells, electrochemical membrane reactors, and associated balance-of-plant equipment; synthesis, fabrication, advanced manufacturing, and in-situ characterization of membranes, thin films, cells, stacks, and reactors; systems using heat, electricity, hydrogen, water, carbon dioxide, biogenic carbon, and other feedstocks to produce hydrogen, ammonia, syngas, fuels, chemicals, and materials; carbon-dioxide capture, conversion, utilization, and storage research; and integration with high-temperature hydrogen production, thermal energy systems, microreactors or reactor emulators, biomass and waste-carbon processing, and electrical-energy-storage systems.
Thermal Energy Management Facility	High-bay facility with supporting laboratory and office space; pilot- and pre-commercial-scale thermal management systems exceeding 1 megawatt of thermal and/or electrical energy; systems for the capture, storage, conditioning, delivery, and conversion of thermal energy; bidirectional electricity-to-heat-to-electricity systems and unidirectional thermal-storage systems; molten-salt and gas test loops operating under steady-state and transient conditions; integration with reactor emulators, concentrated solar, geothermal, biomass gasification, hydrogen fuel cells, and other waste-heat sources; and integrated demonstrations supporting electrical and thermal microgrids, hydrogen and synthetic-fuel production, chemical and materials manufacturing, metals refining, carbon-feedstock processing, and other industrial process-heat applications.
Chemical and Fuel Synthesis Facility	High-bay process research and laboratory space for bench-scale process verification; process integration for mid-scale chemical synthesis from syngas, methanol, and petroleum-related streams; bench- to kilogram-scale catalysis process development.
Concrete Facility	Approximately 20-acre facility for alternative cement materials and hydrogen-enabled concrete production; materials characterization lab; high bay with concrete mixing and curing area; climate-controlled drying chambers; casting/sample preparation area; reinforced floors; high-capacity ventilation; pilot mixers; test kilns; hydrogen-assisted curing chambers; forklifts; ball or attrition mills; powder blenders; sieving equipment; drying ovens; calcination furnaces; batching systems; vibrating tables; mold systems; casting equipment; and dust-control systems.

PG Facility/Process Area	Maximum Development Envelope for EA Analysis
Steel Facility	Characterization lab and large high bay for hydrogen-based steel production research; hydrogen-fed shaft furnace or fluidized-bed Direct Reduced Iron (DRI) unit to reduce iron ore to DRI/sponge iron; electric arc furnace or electric melting equipment; associated hydrogen systems, material handling, off-gas handling, and dust/metals controls as defined during final design.
Data Computing Module	One high bay or equivalent module housing data computing module equipment; grid-interactive operations; dynamic coupling of IT loads with advanced energy systems; advanced cooling such as liquid immersion or two-phase cooling; heat recovery; AI-driven workload orchestration; cyber-physical controls; and pilot-scale hydrogen-fueled backup systems.
MPS Testbed	Outdoor power-system testbed with poles, closed-loop circuits, mobile substation, high-current grid emulator, energized and de-energized testing, fault testing, grid equipment validation, microgrid and large-load studies, robotic/drone work on energized lines, and possible fire-exposure testing.
Training and Operations Facility/ PGTOF	Central operations, reception, meeting, collaboration, office, control room, supervisory control, safety oversight, scheduling, training, digital twin, simulation, AR/VR, and cyber-physical security demonstration functions.
Substation and Switchyard	Approximately 20-acre fenced substation/switchyard with one control/operations building, transformers, switchgear, electrical equipment, reliability and power-quality support, increased research loads, and potential behind-the-meter energy integration.

2.1.5.7 Resource-Specific Use of the Envelope

Each resource section of this EA uses the maximum development envelope to evaluate potential effects relevant to that resource. Depending on the resource area, the appropriate bounding metric may be total disturbance acreage, building footprint, impervious surface, construction duration, peak workforce, truck trips, water demand, electrical demand, process throughput, hazardous material inventory, storage volume, heat input, operating hours, emissions, waste volume, wastewater generation, noise source strength, visual height, or proximity to sensitive resources.

Where final design details are not yet available, the resource-analysis uses conservative assumptions based on the facility descriptions, modular design information, similar DOE NEPA analyses, available analog facilities, and best professional judgment. Where a future facility or activity would be smaller than the bounding assumptions, the impacts would be expected to be equal to or less than those analyzed. Where a future facility or activity would exceed the bounding assumptions, introduce a new type of impact, or require a permit or regulatory review not anticipated in this EA, DOE would complete additional review before authorizing implementation.

For air resources, this EA distinguishes between general facility emissions and process-source emissions. General facility emissions include construction equipment, fugitive dust, vehicle traffic, HVAC systems, emergency generators, laboratory ventilation, offices, high bays, data equipment, and utility infrastructure. Process-source emissions include emissions or potential emissions from biomass conversion, gasification, combustion, CO_2 capture and compression, HTSE, ASU systems, Haber-Bosch ammonia synthesis, urea/nitric acid/fertilizer units, chemical and fuel synthesis, mineral crushing/grinding, frothing and cyanide-related work, kilns, calciners, dryers, hydrogen-assisted curing, hydrogen DRI, EAF or electric melting, and fault/fire testing. Process-source emissions would be evaluated against the source-specific assumptions in the air resources section and applicable permitting requirements.

2.2 No Action Alternative

The No Action Alternative provides a baseline against which the environmental effects of the Proposed Action can be compared. Under the No Action Alternative, DOE would not develop or operate the Proving Ground. Existing conditions at INL would continue, and no new enabling infrastructure or research and support facilities associated with the Proving Ground would be constructed or operated.

Under the No Action Alternative, DOE programs and collaborators would continue to rely on existing infrastructure and facilities to support research, development, testing, and demonstration activities. This would include the continued use of program-specific, geographically dispersed, or temporary infrastructure and facilities, where needed. The limitations associated with the absence of a coordinated Proving Ground, such as reduced flexibility, reliance on ad hoc solutions, and constraints on efficient co-location of activities, would remain unchanged.

The No Action Alternative would not result in new environmental impacts beyond those associated with ongoing INL operations as previously analyzed in existing NEPA documents. The decision also would not provide the infrastructure and facility capability needed to improve efficiency, coordination, or long-term planning for future DOE activities. Environmental impacts associated with any future project-specific actions at INL would continue to be evaluated through separate NEPA reviews, as appropriate.

2.3 Alternatives Evaluated but Dismissed from Analysis

2.3.1 Development of a Single Technology-Specific Facility

This alternative would involve developing infrastructure and facilities tailored to a single program or activity rather than establishing a flexible Proving Ground capable of supporting a range of uses over time. This alternative was eliminated because it would limit adaptability to evolving DOE mission needs and reduce the long-term utility of infrastructure. A program-specific approach would not provide the shared infrastructure capability needed to efficiently support multiple activities and, therefore, would not meet the purpose and need of the Proposed Action.

2.3.2 Development of the Proving Ground at an Off-Site Location

DOE also considered locating the Proving Ground outside the INL Site. This alternative was eliminated because it would not take advantage of existing INL infrastructure, utilities, security, and institutional controls and would likely require developing new access, utilities, and support systems. Developing supporting infrastructure and research facilities at an off-Site location would increase cost, complexity, and environmental disturbance without providing commensurate benefits, and therefore, was not carried forward for detailed analysis.

2.3.3 No New Infrastructure with Project-Specific Development Only

Under this alternative, DOE would forgo developing a coordinated Proving Ground and instead construct infrastructure on a project-specific basis as individual needs arise. This alternative was eliminated because it would not improve efficiency, reduce redundancy, or support long-term planning. Incremental, project-by-project infrastructure development would likely result in repeated environmental reviews, inefficient use of resources, and fragmented development patterns, offering no clear advantage over the Proposed Action.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL IMPACTS

This section describes the existing environmental conditions at INL relevant to the development and operation of enabling infrastructure and research and support facilities associated with the Proving Ground. These baseline conditions provide the context for evaluating potential environmental consequences of the Proposed Action and the No Action Alternative.

The analysis presented evaluates the potential environmental impacts associated with the development and operation of enabling infrastructure and a range of research and support facilities at a programmatic, bounding level. Facilities are described in terms of representative types and general characteristics to establish an upper bound for environmental analysis. Specific facility designs, technologies, processes, and operational characteristics have not been defined and are not evaluated in detail in this EA. Any future project-specific proposals would be subject to separate environmental review, as appropriate.

3.1 Idaho National Laboratory Site

INL is a DOE research and development reservation located on the upper Snake River Plain in southeastern Idaho, approximately 50 miles west of Idaho Falls. INL encompasses approximately 890 square miles and was established in 1949 as the National Reactor Testing Station. Today, INL supports DOE missions related to energy systems research, applied engineering, national security, and environmental stewardship. The Site consists of multiple operational and support areas separated by large expanses of undeveloped land.

INL is situated within a high-desert environment characterized by broad basalt plains, sparse precipitation, and vegetation dominated by sagebrush steppe communities. Approximately 94% of the Site remains undeveloped. Elevations across the Site average approximately 4,900 feet above sea level, and the regional climate is semi-arid, with cold winters, warm summers, and low annual precipitation. Federal lands surround much of the INL Site, including lands managed by the Bureau of Land Management (BLM) and the National Park Service.

The INL Site is listed on the U.S. Environmental Protection Agency's National Priorities List under the CERCLA. The listing addresses legacy releases or threatened releases associated with historical INL Site operations. CERCLA response actions, long-term stewardship requirements, and institutional controls at the INL Site are managed under applicable federal and state regulatory agreements and implementing documents.

Infrastructure at INL includes industrial and research facilities, utility systems, road networks, and support services necessary for laboratory operations. Access to the Site is controlled, and public access is generally limited to designated highways and authorized activities. The Proving Ground would be located within existing INL operational areas selected to be compatible with current land use, available infrastructure, and ongoing laboratory missions and would support the development of enabling infrastructure and research and support facilities within a defined footprint.

3.2 Resource Areas Eliminated from Further Analysis

3.2.1 Land Use

The Proposed Action would occur within an established operational area of the INL Site that is designated for industrial and research activities. Development of infrastructure and facilities within the Proving Ground footprint would be consistent with existing land-use designations, site planning frameworks, and ongoing laboratory missions. Because the Proposed Action would not alter designated land-use patterns or result in conflicts with existing or planned uses, impacts to land use were not analyzed in detail.

The Proposed Action footprint is located within an area subject to CERCLA institutional controls, including CERCLA site ORD-3. These controls were considered as part of the land-use evaluation. The Proposed Action would not change the existing INL land use or require a change in land-use designation. Applicable CERCLA institutional controls would remain in effect during implementation of the Proposed Action, and project activities would be conducted in accordance with those controls. Therefore, the Proposed Action would not conflict with existing land use or compromise the protectiveness of the CERCLA remedy, and land use was not carried forward for detailed analysis.

3.2.2 Visual Resources

The Proving Ground is located within a remote, access-controlled portion of the INL Site where public visibility is limited. Existing visual conditions are characterized by industrial and research facilities interspersed with undeveloped land typical of the high-desert environment. Development of infrastructure and facilities would be consistent with existing visual character and would not introduce features that are substantially different from current Site conditions. Because visual changes would be localized and not readily visible to the public, impacts to visual resources were not analyzed in detail.

3.2.3 Noise

Construction and operation of infrastructure and facilities associated with the Proposed Action would generate noise typical of construction activities and industrial operations. These activities would occur within an established operational area where similar noise sources already exist and are managed under existing INL procedures. Noise impacts would be intermittent, localized, and consistent with ongoing Site activities. Because noise levels would not be expected to result in substantial changes to the acoustic environment or affect sensitive receptors, noise impacts were not analyzed in detail.

3.2.4 Public Health

The INL Site is access-controlled, and public exposure to Site activities is limited. Construction and operation of infrastructure and facilities associated with the Proposed Action would occur within this controlled environment and would be subject to established safety, environmental protection, and regulatory requirements. Because the Proposed Action would not result in pathways for increased public exposure to hazards beyond those already managed at the INL Site, impacts to public health were not analyzed in detail.

3.2.5 Floodplains and Wetlands

The Proving Ground is located within a high-desert environment where floodplains and jurisdictional wetlands are limited or absent. Development would occur within an operational area that has been previously evaluated and managed under INL environmental programs. The Proposed Action is not expected to affect floodplains or wetlands or require compliance with Executive Orders 11988 (Floodplain Management) or 11990 (Protection of Wetlands). Therefore, impacts to floodplains and wetlands were not analyzed in detail.

3.2.6 Prime Farmland

The INL Site is located within a semi-arid region characterized by volcanic soil that is generally not suitable for agricultural production. Lands within the Proving Ground footprint are not designated as prime or unique farmland by the U.S. Department of Agriculture. Because the Proposed Action would not convert prime farmland to non-agricultural use, impacts to farmland resources were not analyzed in detail.

3.3 Air Quality

INL is located in a rural, high-desert region of southeastern Idaho where regional air quality is influenced by natural conditions and dispersed emission sources. Air quality in the region is affected by wind-blown dust, agricultural activities, vehicle traffic, and stationary combustion sources associated with existing INL operations. INL is located within a Prevention of Significant Deterioration (PSD) Class II area, which allows for controlled economic development while maintaining air quality protection. The nearest PSD Class I area is Craters of the Moon Wilderness Area, located approximately 30 kilometers (19 miles) southwest of the CFA. Yellowstone National Park and Grand Teton National Park are located approximately 100 kilometers (62 miles) northeast of INL. Meteorological conditions at the INL Site, including frequent winds and strong atmospheric mixing during daytime hours, generally promote effective dispersion of air pollutants.

Air quality within and surrounding the INL Site is regulated under the federal Clean Air Act and Idaho air quality regulations administered by the Idaho Department of Environmental Quality (DEQ). Under Clean Air Act §109 (42 U.S.C. §7409), the U.S. Environmental Protection Agency established the National Ambient Air Quality Standards (NAAQS). The NAAQS establish legally enforceable limits for six common air pollutants: sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter, carbon monoxide (CO), lead (Pb), and ozone (O_3). These standards are intended to protect public health and welfare from both short-term and long-term exposure.

Idaho implements the NAAQS through monitoring, permitting, emissions controls, and designation of areas as attainment, nonattainment, or unclassifiable. In areas that meet the NAAQS, the PSD program limits allowable increases in pollutant concentrations above baseline levels. PSD increment thresholds vary by area classification, with stricter protections for Class I areas, such as national parks and wilderness areas, and more moderate allowances for growth in Class II areas. Under Idaho air quality regulations, including Idaho Administrative Code IDAPA 58.01.01, construction or modification of stationary sources requires evaluation of emissions to determine whether a Permit to Construct, Permit to Operate, exemption, or other authorization is required before construction or operation.

Federal Land Managers have additional responsibilities for protecting air quality-related values, including visibility, in PSD Class I areas. For sources located more than 50 kilometers from a Class I area, potential visibility impacts may be screened using the Q/D approach, where Q is the annual emission rate, in tons per year, of visibility-impairing pollutants and D is the distance, in kilometers, to the nearest Class I area. A Q/D value less than or equal to 10 is generally considered to indicate negligible visibility impact, and further analysis is typically not required. Because Craters of the Moon Wilderness Area is approximately 30 kilometers southwest of the CFA, final Class I screening for emission sources near CFA would consider the applicable near-field Federal Land Manager review approach, including potential plume visibility impacts, rather than relying solely on the far-field Q/D screening method.

Radiological air emissions, if any, are regulated under 40 CFR Part 61, Subpart H, which limits the effective dose equivalent to the maximally exposed individual to 10 millirem per year. Non-radiological process emissions from the Energy Technology Proving Ground are discussed below. Any future radiological air-emission source would be evaluated under applicable radiological air-emission requirements before operation.

The Energy Technology Proving Ground would be limited to pilot- and demonstration-scale research, testing, and validation activities. For purposes of this EA, campaign process sources are evaluated at no more than 2,000 operating hours per year, and continuous process loops and fugitive sources are evaluated up to 8,760 operating hours per year where that assumption provides the conservative emissions basis. The process facilities evaluated in this EA are the Steel Facility, Ammonia and Fertilizer Integration Facility, Concrete Facility, Biomass Facility, Oil and Gas Facility, and Critical Materials Facility. Future designs or operations that would exceed the process rates, operating assumptions, or emissions envelopes evaluated in this EA, or that would introduce unquantified hazardous air pollutant emissions such as hydrogen cyanide (HCN) from cyanide use, would require additional permitting review and supplemental NEPA review, as appropriate.

3.3.1 Emission Sources

The primary sources of criteria air pollutants and non-radiological hazardous air pollutants at INL include these:

- Diesel and propane-fired boilers
- Emergency standby generators
- Waste treatment activities.

Additional minor sources include small combustion units, non-municipal landfills, storage tanks, testing, cooling towers, munitions testing, and use of chemicals and solvents.

In addition to these existing sources, planned research infrastructure associated with the Energy Technology Proving Ground may include pilot-scale energy systems, materials processing, and industrial research facilities. The activities could involve combustion systems, thermal and chemical processing, hydrogen production and use, materials handling, and electrical testing. Potential emission types from such activities would be consistent with those already present at INL and previously evaluated under sitewide permitting.

3.3.2 Sitewide Permitting

Air emissions at INL are managed under a sitewide Permit to Construct (PTC) with a Facility Emissions Cap (FEC). The PTC-FEC establishes enforceable, facility-wide emission limits to ensure that INL, as a group of contiguous, adjacent, and commonly controlled sources, does not exceed major source thresholds or cause violations of the NAAQS or PSD increments.

New stationary sources, outside the existing scope, are incorporated into the PTC-FEC through the permitting process. Temporary sources, such as construction activities, are evaluated separately for permitting but are considered in cumulative ambient impact assessments.

The FEC was developed by evaluating impacts to air quality and standards from baseline INL emissions, an operational variability component, and a growth component. The growth component represents emissions available for future or modified activities while maintaining compliance with regulatory thresholds.

3.3.3 Class I Area and Visibility

Combined permitted visibility impacting emissions for SO_2, NO_x, and PM_{10} at INL are limited to below 300 tons per year, resulting in Q/D values below 6 for far-field Class I areas. Therefore, far-field regional haze impacts are considered negligible or non-impacted.

Portions of Craters of the Moon Wilderness Area fall within the 50-kilometer near-field distance. Based on the distance to the Class I area, the dispersed nature of emission sources, and the intermittent and non-concurrent operation, potential visibility impacts are expected to be limited. While a highly conservative, non-physical bounding scenario could suggest the potential for visible plume effects, actual impacts under realistic operating and meteorological conditions would be substantially lower and not expected to result in noticeable or adverse visibility impacts within the Class I area.

3.3.4 Radiological Emissions

Radiological emission sources include point sources (e.g., stack and vents) and fugitive sources (e.g., waste areas and contaminated soils). In 2024, the calculated effective dose equivalent to the Maximally Exposed Individual (MEI) from INL operations was 1.50E-02 mrem/year, or 0.15% of the 10 mrem/year standard (DOE-ID, 2025).

3.3.5 MPS Testbed

Construction of the MPS Testbed would result in short-term emissions from equipment exhaust and fugitive dust associated with ground disturbance, grading, and gravel placement. These emissions would be temporary and would be minimized through implementing standard BMPs, such as dust suppression and equipment maintenance. Construction emissions would be minor and consistent with those analyzed for the overall Proposed Action.

Operation of the MPS Testbed would involve intermittent, short-duration testing activities, including energized and de-energized electrical testing and associated mechanical evaluations. Potential air emissions during operation would be limited to minor, nonroutine releases associated with testing activities (e.g., brief particulate generation or localized emissions from electrical equipment underload). The MPS Testbed would not include permanent emission sources, fuel combustion units, or continuous industrial processes.

3.3.6 Impacts to Air Quality

Air emissions from process facilities would be limited by the pilot and demonstration-scale nature of the Proposed Action, the use of air pollution controls, and the operating-hour assumptions used for this EA. The emissions estimates assume controlled operation of the Steel Facility, Ammonia and Fertilizer Integration Facility, Concrete Facility, Biomass, Oil and gas facility, and Critical Materials Facility. Campaign process sources are evaluated at up to 2,000 hours per year, and continuous or fugitive sources are evaluated at up to 8,760 hours per year where appropriate.

The analysis supporting INL's PTC-FEC provides a bounding assessment of air quality impacts, indicating that emissions encompassing the operational variability and growth components would not exceed major source thresholds or violate the NAAQS or PSD increments.

General bounding scenarios from the proposed projects associated with the Proving Grounds were developed to estimate potential emission impacts. Operations of the projects are intended to be intermittent and may not operate concurrently; however, for conservative purposes their combined emissions were utilized to evaluate potential impacts against INL's existing PTC-FEC growth component. Table 3 details the estimated scaled projected emissions based on similar surrogate sources or general emission factors, and Table 4 tabulates those combined emissions along with INL's existing PTC-FEC growth component. Estimated emissions do not include other sources whose emissions are expected to be accounted for from other sources such as the data computing module or sources whose emissions are considered insignificant, such as the Electrical Grid Testing.

Table 3 and Table 4 demonstrate that the combined impacts from these intermittent sources are consistent with the growth component of the PTC-FEC and within the bounds of the impacts analyzed in the permit application.

Because the Proposed Action would involve pilot and demonstration-scale research rather than commercial production, and because process emissions would be controlled and maintained within the EA emissions envelope, operational air quality impacts from the facilities are expected to be small and would not approach major stationery-source thresholds. Final equipment selection, stack configurations, controls, and potential-to-emit calculations would be confirmed during detailed design and air permitting.

Operation of the Energy Technology Proving Ground would involve intermittent, short-duration testing activities, including energized and de-energized electrical testing and associated mechanical evaluations. Potential air emissions during operation would be limited to minor, nonroutine releases associated with testing activities. The Energy Technology Proving Ground would not include permanent emission sources, fuel combustion units, or continuous industrial processes.

Development and operation of enabling infrastructure associated with the Proving Ground would result in temporary air emissions primarily associated with construction activities and routine infrastructure maintenance. Construction-related emissions would include fugitive dust generated from site preparation, grading, and vehicle movement on unpaved surfaces, as well as exhaust emissions from construction equipment and onsite vehicles.

Routine operation and maintenance of Proving Ground infrastructure would generate emissions comparable to those associated with existing INL activities, including emissions from maintenance vehicles and minor facility support equipment. The Proposed Action does not authorize installation or operation of energy conversion systems, large stationary combustion sources, or other activities that would introduce new major emission sources.

Based on the limited and intermittent nature of testing activities, emissions from operating the MPS Testbed would be negligible and would not result in exceedances of applicable air quality standards or conformity thresholds. All activities would be conducted in compliance with applicable air quality regulations and Site requirements.

Critical materials activities involving cyanide are bound only if conducted in closed or controlled systems with no unquantified atmospheric HCN emissions. Any operation with potential HCN emissions must be separately quantified before it can be included in the project-wide air-emissions upper bound.

Table 3 presents the operational emissions envelope used for this EA. These values are rounded, conservative bounding values derived from the preliminary emissions estimates for the quantified process facilities. The values are not proposed permit limits unless separately adopted through an air permit or enforceable project commitment; rather, they define the emissions envelope evaluated in this EA. Table 4 shows the projected combined Proving Ground emissions and PTC-FEC growth component. Operations that would exceed the envelope would require additional review before implementation.

Table 3. Projected operational Proving Ground emissions.

Pollutant	Steel Facility (T/yr)	Ammonia & Fertilizer Facility (T/yr)	Concrete Facility (T/yr)	Biomass Facility (T/yr)	Oil & Gas Facility (T/yr)	Critical Materials Facility (T/yr)
PM	0.45	0.08	0.05	8.42	0.85	0.17
CO	0.38	0.18		3.31	1.12	
NOx	0.18	0.21	0.3	3.68	0.30	
SO2	0.03	0.02		0.42	0.35	
VOCs		0.06		0.003	0.18	
Total HAP	0.01	1.11	0.02		1.84	

Table 4. Projected combined Proving Ground emissions and PTC-FEC growth component.

Pollutant	Proving Ground Combined Emissions (tons/yr)	PTC-FEC Operational Growth (tons/yr)	Combined % of Growth Component
PM	10.03	73.55	13.6%
CO	4.99	79.34	6.3%
NOx	4.67	5.65	82.6%
SO2	0.82	70	1.2%
VOCs	1.90	74.82	2.5%

3.3.6.1 Class 1 Area Impacts

The Proposed Action is not expected to affect visibility in Class I areas, including Craters of the Moon Wilderness Area. Emissions associated with operational variability and growth represent bounding conditions and are not expected to occur simultaneously across all sources. In practice, emissions would be intermittent, spatially distributed across the INL Site, and influenced by varying operating schedules and meteorological conditions, making concurrent plume overlap unlikely. As a result, potential visibility impacts would be dispersed and substantially less than those associated with a single, combined plume. Therefore, while minor and infrequent visibility effects cannot be completely ruled out under rare combinations of emissions and meteorological conditions, such impacts would be temporary, localized, and not expected to meaningfully degrade visibility within the Class I area.

3.3.6.2 Future Actions

The campus is intended to support future projects; however, each project will still need to be fully defined and analyzed to ensure it meets the bounding envelope requirements in this EA.

3.4 Water Resources

The INL Site is located on the Eastern Snake River Plain and overlies the Snake River Plain Aquifer (SRPA), which serves as the primary regional groundwater resource. The SRPA underlies the Eastern Snake River Plain, an area of approximately 10,800 square miles (Lindholm 1996). An estimated 80 to 120 million acre-feet of water is stored in the upper 200 feet of the aquifer (Lindholm 1996). The U.S. Environmental Protection Agency has designated the SRPA a sole source aquifer, meaning it is the principal source of drinking water for the area it serves (IDEQ). The SRPA also supplies water for irrigated agriculture on the plain (USGS). Groundwater beneath the INL Site is used to support laboratory operations and is regulated under applicable federal and state requirements. Depth to groundwater varies across the Site and is generally hundreds of feet below ground surface in operational areas.

Surface water features within the INL Site are limited and typically intermittent. The Big Lost River, Birch Creek, and Little Lost River may convey water seasonally, depending on regional precipitation and snowmelt conditions. Most areas of the INL Site, including developed operational areas, are characterized by arid conditions with minimal perennial surface water presence.

Stormwater management at INL is conducted in accordance with applicable regulatory requirements and institutional procedures. Construction activities that disturb one or more acres may require coverage under applicable stormwater permits, and BMPs are implemented to control erosion and sediment transport.

The area proposed for developing the Proving Ground is located within an existing operational area of the INL Site and is subject to the same groundwater, surface water, and stormwater management frameworks described above. These conditions represent the baseline against which potential impacts of the Proposed Action and the No Action Alternative are evaluated.

3.4.1 Impacts to Water Resources

Development of enabling infrastructure for the Proving Ground may involve ground disturbance associated with preparation of the site, installation of utilities, construction of general-purpose facilities, and development of access roads and test pads. Such activities could temporarily increase the potential for soil erosion and sediment transport during construction.

These effects would be localized, temporary, and managed through the implementation of standard erosion and sediment control BMPs consistent with INL procedures and regulatory requirements. Where applicable, stormwater permitting requirements would be met prior to construction activities.

3.4.1.1 Water Rights

The INL Site's Federal Reserved Water Right is 35,000 acre-ft/yr (11,405 MG/yr), not to exceed a maximum diversion rate of 80 ft3/s (35,906 gpm). Historically, DOE has used only a small fraction of its allocation. The annual total diversion measurements from 2010 to 2025 have ranged from 6.09% to 7.52% of the allotted 35,000 acre-feet. In addition, the consumptive use over the last 15 years remained relatively consistent at 2.39 to 3.69%. The average volume of water diverted for all INL Site production and potable wells remains within the established water right. The proposed activities at the Proving Grounds will increase water use at the INL Site, but not beyond the limits established in the INL's Federal Reserved Water Right.

3.4.1.2 Estimated Water Use

The currently identified facilities include approximately 21 office pods across eight representative facility types: five critical materials pods, one ammonia/fertilizer pod, six thermal facility pods, two chemical/fuel synthesis pods, one concrete facility pod, one steel facility pod, three training/operations pods, and two biomass facility pods. Assuming 11 employees per pod, these facilities would accommodate approximately 231 employees. Domestic potable water use was estimated at 25 gallons per person per day, which is within the U.S. Environmental Protection Agency's planning range of 20 to 35 gallons per employee per day for domestic uses at commercial and industrial facilities and represents a reasonable estimate for restroom, handwashing, and other routine employee water use. Based on these assumptions, projected domestic water use is approximately 5,775 gallons per operating day, as shown in Table 5. Assuming a typical 250-day work year, 52 five-day workweeks minus approximately 10 holidays, the facilities would use approximately 1,443,750 gallons, or 1.44 million gallons, annually. This estimate is limited to employee-related domestic water use and does not include industrial processes, fire protection, irrigation, cooling, or other facility-specific demands.

The currently projected employee-related potable water demand for the Proving Grounds is approximately 1.44 million gallons, or 4.43 acre-feet, annually (see Table 5). Even if this entire quantity is treated as an additional diversion, it would represent only approximately 0.013% of INL's 35,000-acre-foot annual Federal Reserved Water Right. This minimal increase would have little effect on INL's historical diversion rate of 6.09% to 7.52% and would remain well within the established water-right limits. Any additional process, cooling, irrigation, or other facility-specific water demands will be evaluated as facility designs are developed.

Table 5. Estimated Proving Ground potable water use.

Representative Facility Types	Approximate Number of Office Pods per Facility Currently Identified	Approximate Water Use in Gallons/Person/Day	Approximate Water Use in Gallons per Day Assuming Eleven Employees per Pod
Critical Materials	5	25	1375
Ammonia/Fertilizer	1	25	275
Thermal Facility	6	25	1650
Chemical/Fuel Synthesis	2	25	550
Concrete Facility	1	25	275
Steel Facility	1	25	275
Training/Ops Facility	3	25	825
Biomass Facility	2	25	550
Total Gallons per Day			5775

3.4.1.3 Current Potable Water

Although the proposed Proving Ground potable water requirements have not yet been fully defined, the amount of water available to support the development will ultimately be limited by CFA's existing well production capacity. The numbers used in this section are based on estimated water use. CFA currently has two deep-well pumps, each rated at approximately 600 gallons per minute. Assuming the wells operate one at a time and the operating well can run continuously for 24 hours; the available source production capacity is approximately 864,000 gallons per day. Current CFA peak summer water use is approximately 440,000 gallons per day. Adding the projected demand of 5,775 gallons per day would increase total peak demand to approximately 445,775 gallons per day, which is within the capacity of a single operating well. The second well provides redundant source capacity and is not included as additional simultaneous production. Therefore, the existing wells are expected to provide sufficient capacity for the proposed Proving Ground.

Potable water and fire-water demands may be evaluated separately because they have different capacity and operational requirements. Existing CFA infrastructure uses a combined potable and fire-water system. Routine potable water demands associated with the Proving Grounds are expected to be accommodated by the existing system; however, any facility requiring significant fire flow, storage, or other fire-protection capacity will be evaluated during facility design. Dedicated fire-water infrastructure or improvements to the existing system may be required if it cannot support the necessary fire-water demand while maintaining potable water service.

3.4.1.4 Potable Water Handling Options

Additional Potable Water Holding Tanks

In the case of needing additional capacity at the CFA system, installing an additional potable water storage tank at CFA and connecting it to the existing combined potable and fire-water system would be feasible. The tank would store water supplied by the existing CFA wells and provide additional operational flexibility, equalization storage, and system reliability during periods of elevated demand. If the tank would also support fire protection, the required fire-water storage volume would be evaluated separately during design. The tank would not increase production capacity or INL's authorized water right but would improve management of water already produced by the existing system.

Potential impacts to water resources would primarily include localized ground disturbance during construction and limited operational risks associated with leakage, overflow, loss of disinfectant residual, inadequate water turnover, or contamination of stored water. These impacts would be bound by requiring the tank to be properly sited, designed, approved, constructed, disinfected, tested, operated, and maintained. Tank sizing would consider reasonably foreseeable potable water demand, peak-hour use, well-pumping capacity, operational and standby storage, water turnover, and any applicable fire-protection requirements.

Additional Potable Water Well

In the case of needing additional capacity at the CFA system, a new groundwater production well could be installed at CFA and connected to the existing combined potable and fire-water system. An additional well could provide additional source capacity, operational flexibility, and redundancy for the existing CFA wells. The required capacity and operating configuration would be determined during facility design based on reasonably foreseeable potable water demand, peak demand, fire-protection requirements, existing well capacity, and system reliability. The new well would not increase INL's authorized Federal Reserved Water Right, and all withdrawals would remain subject to the existing annual volume and maximum diversion-rate limits.

Potential impacts to water resources would primarily include localized ground disturbance during well construction and potential effects on groundwater from drilling, well development, testing, and long-term pumping. Improper well construction could also create a pathway for contaminants to enter the aquifer or move between water-bearing zones. These impacts would be bound by requiring the well to be properly sited, designed, permitted, constructed, sealed, developed, disinfected, and sampled before being placed into service. Any new well would be permitted and constructed in accordance with applicable state permitting requirements and well construction and driller licensing standards. Siting and design would consider nearby contaminant sources, existing wells, required separation distances, aquifer characteristics, anticipated drawdown, and potential interference with other groundwater users.

3.4.1.5 Wastewater

While wastewater quantities aren't fully defined, centralized wastewater management capacity will be primarily limited by the available reserve capacity of the CFA wastewater lagoons. The lagoon's total capacity is 17,000 GPD, and current wastewater discharge from CFA averages approximately 10,000 GPD. This leaves approximately 7,000 GPD of available wastewater management capacity for facility expansion which would support sanitary water needs for approximately 280 people. If wastewater volumes are anticipated to exceed these limits in the future, wastewater options will be evaluated and implemented to meet project needs. The Proposed Action does not authorize activities involving injection wells or wastewater discharge to surface waters.

Wastewater management may be evaluated separately for sanitary and non-sanitary sources. Existing onsite infrastructure primarily supports sanitary wastewater. New non-sanitary sources (e.g., industrial wastewater, non-sanitary discharges, blowdown) may require alternative disposal or management pathways (additional evaporation ponds or reactivation of the reuse system) if current infrastructure is unable to accommodate additional sanitary wastewater.

Wastewater Handling Options

Wastewater Pond

Under the wastewater pond option, wastewater from one or more future facilities would be conveyed to a centralized pond or lagoon system for permitted treatment, storage, evaporation, infiltration, or disposal. This option would address the primary water resource constraint associated with future development, which is wastewater handling capacity rather than water supply availability.

Potential impacts to water resources would include localized ground disturbance during construction and the potential for seepage, overtopping, stormwater interaction, or improper operation during use. These impacts would be bound by requiring the pond to be properly sited, designed, permitted, and maintained. The pond would be sized to accommodate reasonably foreseeable wastewater flows from the facilities it would serve, including peak flows, precipitation inputs, required freeboard, and contingency storage. It would be located to avoid sensitive water resources, including wetlands, surface waters, floodplains, shallow groundwater areas, and drinking water wells, unless additional engineering controls and approvals are obtained.

With appropriate siting, liner or seepage controls, stormwater diversion, monitoring, freeboard, and operations and maintenance requirements, impacts to surface water and groundwater would be expected to be limited. The centralized pond could provide improved control and monitoring compared to multiple dispersed systems; however, it would also concentrate wastewater management in one location, increasing the importance of capacity, inspection, and maintenance. If future wastewater flows or wastewater characteristics exceed the pond's approved design or permit limits, additional capacity, pretreatment, permit modification, or supplemental review would be required before additional facilities could connect to the system.

Individual or Shared Septic Systems

Under the septic system option, wastewater from future facilities would be managed through onsite wastewater treatment systems. These systems could serve individual facilities or could be designed as shared systems serving multiple facilities in tandem. Septic systems would generally include tanks, conveyance piping, and subsurface disposal fields, with final design based on wastewater flow, wastewater characteristics, soil suitability, groundwater depth, required setbacks, and available land area.

Potential impacts to water resources would primarily relate to subsurface wastewater disposal. If systems are improperly sited, undersized, poorly maintained, or installed in unsuitable soils, wastewater could receive inadequate treatment before reaching groundwater or nearby surface water pathways. Potential impacts could include hydraulic overloading, surfacing effluent, groundwater mounding, nutrient loading, or migration of wastewater-related constituents.

Individual septic systems would distribute wastewater flows across multiple facility locations and could reduce the amount of wastewater managed at any one point. However, this approach could increase the number of drain fields and the cumulative area affected by wastewater disposal. Shared or tandem septic systems could reduce the number of disposal areas and allow wastewater to be managed in more suitable locations, but they would concentrate flows and increase the consequence of system failure or inadequate capacity.

With site-specific soil and groundwater evaluations, compliance with setback and separation requirements, appropriate system sizing, replacement drain field areas, and routine inspection and maintenance, impacts to water resources from septic systems would be expected to be limited. If future facility flows or wastewater characteristics exceed the approved capacity of an individual or shared system, additional capacity, pretreatment, permit modification, or use of another wastewater management option would be required before additional facilities could connect.

The septic system option would be expected to have limited impacts to water resources if systems are properly sited, designed, permitted, installed, and maintained. Individual systems would distribute wastewater flows across facility sites and may reduce the consequence of failure at any single location, but they could increase the total number of wastewater disposal areas and associate cumulative loading across the project area. Shared or tandem systems could reduce the number of disposal areas and allow use of more suitable locations, but they would concentrate wastewater flows and increase the importance of design capacity, maintenance, and contingency planning.

The principal water resource risks for both approaches would be inadequate soil treatment, insufficient separation from groundwater or bedrock, excessive wastewater loading, failure to maintain required setbacks, surfacing effluent, and poor long-term maintenance. These risks would be minimized by requiring site-specific soil and groundwater evaluations, system sizing based on maximum reasonably foreseeable flows, compliance with setback and separation requirements, use of replacement drain field areas, and implementation of inspection and maintenance procedures.

Septic systems would not be expected to affect regional water supply availability because they would address wastewater disposal rather than water withdrawal. However, they would influence the overall capacity for future facility development by determining where and how much wastewater can be safely managed onsite. If the number of facilities, wastewater flows, or wastewater characteristics exceed the capacity assumed for individual or shared septic systems, additional wastewater management infrastructure or supplemental environmental review would be required before those facilities become operational.

Reuse Permit Option

Under the reuse permit option, wastewater from one or more future facilities would be treated and managed as recycled water under a reuse permit issued by the DEQ. In Idaho, reuse permits apply where treated effluent is proposed for application to crops or other beneficial uses, while discharge to a surface water body would require an Idaho Pollutant Discharge Elimination System permit. Idaho's Recycled Water Rules, IDAPA 58.01.17, establish the procedures and requirements for reuse permits.

Potential water resource impacts would primarily relate to treatment, storage, conveyance, and application of recycled water. Impact mechanisms could include over-application, runoff, overspray, deep percolation, nutrient or constituent loading, inadequate treatment, improper use, cross-connection with potable systems, or insufficient storage during periods when reuse is not available. These risks would be minimized through DEQ permit conditions addressing treatment level, allowable uses, wastewater characterization, hydraulic and constituent loading rates, monitoring, reporting, site management, signage, and operational controls.

For municipal wastewater, recycled water would be classified as Class A, B, C, D, or E, with allowable uses and restrictions determined by treatment level and water quality. For industrial wastewater, permit conditions would be developed case-by-case based on wastewater characteristics, treatment needs, human health and environmental risk, public access, nuisance prevention, intended reuse, and method of application.

With proper treatment, Idaho DEQ permit coverage, adequate storage, appropriate reuse areas, monitoring, and compliance with permit conditions, impacts to water resources from the reuse permit option would generally be expected to be limited. However, the reuse option would only provide adequate wastewater handling capacity if the permitted reuse capacity, treatment reliability, seasonal storage, and available beneficial uses are sufficient to manage reasonably foreseeable flows from the facilities served. If future flows or wastewater characteristics exceed the approved permit conditions, additional capacity, pretreatment, permit modification, or supplemental review would be required before additional facilities could rely on the reuse system.

3.5 Geology and Soils

The INL Site is located on the Eastern Snake River Plain, a geologic province characterized by extensive basaltic lava flows, interbedded sediments, and relatively low-relief topography. Surface geology at the INL Site consists primarily of basalt flows of varying ages, overlain in places by wind-deposited (eolian) and alluvial sediments. Soils across the Site are derived from volcanic parent materials and are generally shallow to moderately deep, well-drained, and susceptible to wind erosion when disturbed.

Topography within operational areas of the INL Site is generally flat to gently sloping, with localized variations associated with past lava flows and sediment deposition. Natural hazards in the region include seismic activity associated with the broader tectonic setting of the Snake River Plain; however, INL facilities and infrastructure are designed and constructed in accordance with applicable structural and seismic design requirements.

The area proposed for development of the Proving Ground is located within an established operational area of the INL Site and includes a combination of previously disturbed and undisturbed soils typical of the surrounding high-desert environment. Existing conditions reflect a mix of native soils and areas influenced by past Site activities, including grading and infrastructure development. These geologic and soil conditions provide the baseline for evaluating potential impacts associated with construction and operation of infrastructure and research and support facilities under the Proposed Action.

3.5.1 Impacts to Geology and Soils

Development of enabling infrastructure and research and support facilities associated with the Proving Ground would involve ground-disturbing activities such as grading, excavation, installation of utilities, construction of access roads, development of general-purpose pads, and construction of buildings and associated structures. These activities would result in a localized disturbance of soil and minor alteration of surface conditions within the project area. Disturbance would occur within the defined footprint and would be implemented in phases, resulting in incremental and spatially distributed impacts rather than a single continuous disturbance. Construction and operation of the MPS Testbed would involve similar ground-disturbing activities, including grading, compaction, and installation of associated electrical infrastructure, and would result in localized and managed impacts consistent with those described for the overall Proposed Action.

Construction activities may temporarily increase the potential for soil compaction, erosion, and sediment transport. These effects would be minimized through implementation of established INL erosion and sediment control practices, including stabilization of disturbed areas, application of BMPs, and restoration of surface conditions following construction where appropriate. Where required, construction activities would be conducted in accordance with applicable stormwater management requirements.

Construction of infrastructure and facilities may require the use of fill materials such as soil, aggregate, and gravel. These materials would be obtained from approved sources consistent with INL Site practices. The quantities required represent a small fraction of available material resources and would not result in expansion of existing borrowed sources or measurable impacts to regional geologic resources.

Ground disturbance would be limited to areas necessary to support infrastructure and facility development and would not alter regional geologic features. The Proposed Action does not involve subsurface resource extraction, deep drilling, or activities that would alter regional geologic conditions. Seismic considerations associated with facility and infrastructure development would be addressed through compliance with applicable design and construction standards.

Because this work occurs within ORD-3, there is the potential for unearthing UXO; personnel will follow the applicable Munitions Response Area Activity Notification, which outlines procedures for working within a UXO area.

In the context of the INL Site, which encompasses a large land area with ongoing infrastructure and facility development activities, the incremental disturbance associated with the Proving Ground would represent a small contribution relative to overall Site conditions. Because disturbances would be localized, phased, and managed through existing environmental protection practices, impacts to geology and soils are expected to be minor.

When considered in combination with other past, present, and reasonably foreseeable activities at the INL Site, the incremental contribution of Proving Ground development would not result in a measurable change to regional geological conditions or soil resources. Future project-specific actions, if proposed, would be subject to separate environmental review, as appropriate.

Under the No Action Alternative, DOE would not develop Proving Ground infrastructure or facilities. Existing soil and geologic conditions within the proposed Proving Ground area would remain unchanged except for ongoing INL operational activities.

3.6 Ecological Resources

The INL Site consists primarily of sagebrush steppe habitat. About 94% of the INL Site remains undeveloped (DOE-ID and United States Fish and Wildlife Service, 2014), and roughly 60% of the land is available for livestock grazing. For this EA, ecological resources evaluated include general vegetation and wildlife, special-status species, and conservation planning areas present within the Proving Ground and within a two-mile radius of the Proving Ground footprint (hereafter, ecological review area; INL 2026). Data for the ecological review area was compiled from existing datasets managed by INL. Information specific to the proposed Proving Ground footprint was gathered through site-specific surveys and incidental observations (INL 2026). More information and detailed descriptions of ecological resources associated with the Proposed Action can be found in "Ecological Resources Report for the Proposed Energy Technology Proving Grounds at the INL" (INL 2026).

3.6.1 Vegetation

The vegetation across INL is characterized by a predominance of shrub overstory and a diverse understory of grasses and forbs. Most of the plant communities across the INL Site are dominated by native species and are in good ecological condition, though approximately 42% of the INL Site has been affected by wildland fire over the past 30 years, which has resulted in the loss of sagebrush across much of the affected area (Forman et al. 2024). Areas that are dominated by non-native annual species tend to be a minor component of INL Site vegetation communities and occur in small patches of limited size (Shive et al. 2019). Several INL vegetation communities contain National Vegetation Classification Associations that are assigned an elevated conservation ranking of G1 (critically imperiled), G2 (imperiled), or G3 (vulnerable).

Nearly 500 vascular plant species have been documented on and adjacent to the INL Site (Anderson et al. 1996), several of which are considered special-status plant species. Special-status plant species at the INL Site include those classified as threatened or endangered under the Endangered Species Act (ESA; 16 United States Code 1531-1544), as sensitive species as recognized by the BLM and Idaho Department of Fish and Game (IDFG), or as plant species with elevated conservation rankings of G1, G2, G3, or state ranks of S1 (critically imperiled), S2 (imperiled), or S3 (vulnerable).

3.6.1.1 Ecological Review Area

Within the ecological review area, the most widespread vegetation community is the Big Sagebrush – Green Rabbitbrush (Threetip Sagebrush) Shrubland (INL 2026). These communities are generally in good ecological condition, featuring an overstory of big sagebrush (*Artemisia tridentata*) and green rabbitbrush (*Chrysothamnus viscidiflorus*). The understory is composed of native herbaceous species, including thickspike wheatgrass (*Elymus lanceolatus*), bottlebrush squirreltail (*Elymus elymoides*), Sandberg bluegrass (*Poa secunda*), hood's phlox (*Phlox hoodii*), and western tansymustard (*Descurainia pinnata*). While non-native species, such as crested wheatgrass (*Agropyron cristatum*), cheatgrass (*Bromus tectorum*), saltlover (*Halogeton glomeratus*), and annual mustards (*Sisymbrium* spp., *Descurainia* spp.), occasionally dominate communities, they are more commonly present as minor components within the native vegetation throughout the ecological review area.

Three out of the eight vegetation communities in the ecological review area have the potential to support 10 different National Vegetation Classification Associations that are considered to have elevated conservation rankings of G1, G2, or G3. Additionally, suitable habitat for 12 special-status plant species exists within the ecological review area (INL 2026).

3.6.1.2 Proving Ground Footprint

Within the Proving Ground footprint, surveys identified 56 native species and seven introduced species. Big sagebrush was the most prevalent shrub, and Sandberg bluegrass was the most common herbaceous plant (INL 2026). Introduced species were distributed throughout the project area, with cheatgrass being the most frequently observed among them; however, they remain minor components of the vegetation communities throughout the Proving Ground footprint. The only state-listed noxious weed detected within the Proving Ground footprint was rush skeletonweed (*Chondrilla juncea*).

There were no vegetation communities with elevated conservation rankings observed within the Proving Ground footprint. However, three special status plant species were observed during site-specific surveys within the Proving Ground footprint: Lewis River suncup (*Camissonia parvula*; G5S2) with five observations (78 individuals), narrowleaf oxytheca (*Oxytheca dendroidea*; G4S3) with two observations (44 individuals), and nakedstem gymnosteris (*Gymnosteris nudicaulis*; G4S3) with 11 observations (512 individuals). It is important to note that surveys were conducted during a limited timeframe, so the absence of detection does not necessarily mean other special-status plant species are not present, as some species may favor different periods or growing conditions.

3.6.2 Wildlife

The INL Site supports a diverse array of wildlife, including two amphibians, 13 reptiles, 57 mammals, over 200 bird species, and more than 1,200 insect species. Many of these species are sagebrush obligates, such as the greater sage-grouse (*Centrocercus urophasianus*), pygmy rabbit (*Brachylagus idahoensis*), and sagebrush lizard (*Sceloporus graciosus*), or are associated with shrub-steppe and grassland habitats, which dominate the vegetation communities across the INL Site. Additionally, infrastructure associated with INL's mission provides habitat for species that utilize vertical structures, artificial cavities, landscaping, and water resources.

Special-status wildlife species at the INL Site include ESA-listed threatened or endangered species, candidates and species that are currently under review for ESA listing, species protected by specific federal laws, United States Fish and Wildlife Service (USFWS) Birds of Conservation Concern, species identified as sensitive by the BLM, and species identified as species of greatest conservation need or Species of Greatest Information Need by IDFG. There are currently 72 special-status wildlife species with documented occurrence or the potential to occur on the INL Site.

3.6.2.1 Ecological Review Area

Wildlife species known or expected to occur within the ecological review area are associated with sagebrush and shrub-steppe/grassland vegetation communities and unique habitats associated with INL Site infrastructure, including buildings, storage lagoons, and landscaping. For a full list of species, see Ecological Resources Report for the Proposed Energy Technology Proving Grounds at the INL (INL 2026).

The insect community at INL is diverse, including primary pollinators from the beetle, fly, bee/wasp, and butterfly/moth orders contributing to the ecosystem. Although a full inventory has not been completed, historical studies indicate a rich variety of pollinating insects supported by the area's intact and recovering sagebrush habitat and diverse flowering plant genera. The ecological review area contains many of these habitats and may host a large subset of these species.

Historical INL wildlife datasets indicate that 28 special-status species have documented occurrence or the potential to occur within the ecological review area. This includes 12 species of birds, eight bats,

three pollinators, two ungulates, one lagomorph, and one reptile. Many of these species have overlapping USFWS, BLM, and IDFG designations. Of these 28 species, one is proposed endangered (Suckley's cuckoo bumble bee [*Bombus suckleyi*]), and four are under review for listing under the ESA (little brown myotis [*Myotis lucifugus*], Morrison's bumble bee [*Bombus morrisoni*], pygmy rabbit, and western bumble bee [*Bombus occidentalis*]). The bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) are considered non-Bird of Conservation Concern vulnerable species and are protected under the Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668d). There are no known nests for either species, but both have been documented wintering within the ecological review area (INL 2026). Additionally, the ecological review area falls within the range of the monarch butterfly (*Danaus plexippus*, Proposed Threatened) and the pinyon jay (*Gymnorhinus cyanocephalus*, Under Review). However, critical habitat elements (milkweed [*Asclepias* spp.] for monarchs, juniper [*Juniperus spp.*] habitat for pinyon jays) for these species are not present within the ecological review area.

3.6.2.2 Proving Ground Footprint

Forty-six wildlife species were observed during Site characterization surveys of the Proving Ground footprint, 15 of which are considered special-status species. These observations included 29 species of birds, five species of bats, four ungulates, three mammalian predators, three lagomorphs, and two reptiles. Of the bird species, two are non-native, five breed in non-present habitat types within the Proving Ground footprint and were likely transient individuals as they were only observed during spring or fall migration, and ten are commonly found among infrastructure and landscaping at the CFA. The remaining 11 species include four sagebrush-obligate and 13 shrub-steppe/grassland-associated species, of which five were documented nesting within the Proving Ground footprint. Seven of the observed bird species—Brewer's sparrow (*Spizella breweri*), common nighthawk (*Chordeiles minor*), ferruginous hawk (*Buteo regalis*), greater sage-grouse, loggerhead shrike (*Lanius ludovicianus*), sage thrasher (*Oreoscoptes montanus*), and sagebrush sparrow (*Artemisiospiza nevadensis*)—are designated as special-status wildlife species by the USFWS, BLM, or IDFG due to population declines resulting from the loss of sagebrush, shrubland, and grassland communities.

Of the six species of bats, two are migratory tree-dwelling species (hoary bat [*Lasiurus cinereus*] and silver-haired bat [*Lasionycteris noctivagans*]). No breeding habitat is present for these species within the Proving Ground footprint, and observations were limited to spring and fall migration. The other four species (big brown bat [*Eptesicus fuscus*], little brown myotis, western long-legged myotis [Myotis volans], and western small-footed myotis [*Myotis ciliolabrum*]) are considered habitat generalists, often using human structures for roosting, and are commonly detected at CFA. All six bat species are designated as special-status wildlife due to population declines resulting from white-nose syndrome, habitat loss, and wind energy development.

All three common ungulate species (elk [*Cervus canadensis*], mule deer [*Odocoileus hemionus]*, and pronghorn *[Antilocapra americana]*) were detected within the Proving Ground footprint. These three species occur across the INL Site and are among the most notable game species. Elk and mule deer were the most frequently observed and are more tolerant of human activity than pronghorn. Additionally, moose scat was prevalent throughout the footprint. While moose are not common on the INL Site, they are occasionally observed, primarily in the winter. Pronghorn are considered Species of Greatest Conservation Need by IDFG due to habitat fragmentation and restricted migration corridors. While mule deer do not have a specific designation, their populations are declining across the West because of habitat loss and fragmentation and their susceptibility to chronic wasting disease.

American badger (*Taxidea taxus*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*) were observed within the Proving Ground. Bobcats and coyotes are considered habitat generalists, and both are wide-ranging. American badgers are found in shrub-steppe and grassland communities but often have large home ranges. No potential breeding areas for these species were found within the Proving Ground footprint.

Mountain cottontail (*Sylvilagus nuttallii*), jackrabbit (*Lepus* spp.), and pygmy rabbit were detected within the Proving Ground footprint. Mountain cottontails are habitat generalists but are more closely tied to sagebrush communities in the northern part of their range. Jackrabbits are shrub-steppe/grassland associates, and pygmy rabbits are sagebrush obligates. Pygmy rabbits are a special-status species due to habitat loss and fragmentation of sagebrush communities and are currently under review for potential listing under the ESA.

The two reptile species, sagebrush lizard and pygmy short-horned lizard (*Phrynosoma douglasii*), are common shrubland-associated species. Pygmy short-horned lizards are considered Species of Greatest Information Need by IDFG due to their reliance on shrub-steppe ecosystems and loss of invertebrate prey species from pesticide use.

No sensitive pollinator species were detected within the Proving Ground footprint. However, surveys were time-limited; non-detection for these species does not imply non-occurrence as all species nest underground and can be difficult to detect.

3.6.2.3 Conservation Planning Areas

There are currently two conservation plans at INL that are related to the proposed actions. These conservation plans identify specific threats and tailor conservation measures to address them, including specific mitigation measures, project-specific instructions, hold points, and BMPs that involve seasonal time-of-day restrictions, buffers, and pre-activity surveys. These measures are intended to minimize impacts to ecological resources and would be applied to the extent possible during and after the proposed actions.

The Candidate Conservation Agreement (CCA) for the greater sage-grouse (DOE-ID and USFWS 2014) identifies threats to greater sage-grouse and their habitat and defines conservation measures and objectives to avoid or minimize threats to the species. In conjunction with the CCA, PRD-407 requires sagebrush mitigation for any project in which related activities result in the loss of sagebrush habitat or recovering sagebrush habitat. Any activities taking place contrary to the conservation measures and BMPs listed in the CCA would require further consultation between DOE and USFWS (DOE-ID and USFWS 2014). Additionally, the CCA established the Sage-Grouse Conservation Area (SGCA) designed to provide a high level of protection for greater sage-grouse and its seasonal habitats. The SGCA occupies a portion of the ecological review area (INL 2026), but not the project footprint. By committing to limit certain activities and deprioritize this 132,020 ha (326,229-acre) area for infrastructure development, DOE-ID aims to protect most sage-grouse leks and much of the remaining sagebrush habitat on the INL Site. Beyond its focus on the greater sage-grouse, the SGCA also supports conservation of numerous other special-status species experiencing population declines across their ranges due to habitat loss and degradation. These include breeding habitats for three sagebrush-obligate songbirds—the Brewer's sparrow, sage thrasher, and sagebrush sparrow—as well as critical winter range and migratory corridors for pronghorn and mule deer. Additionally, the SGCA provides year-round habitat for the sagebrush-obligate pygmy rabbit.

The INL Site Bat Protection Plan (BPP): Large undisturbed areas of shrub-steppe habitat, basalt outcrops, lava caves, juniper uplands, ponds, and landscape trees at industrial facilities provide complex and abundant foraging and roosting habitat for a variety of resident and transient bat species. The INL Site BPP (DOE-ID 2018) provides a framework to reduce mission impacts on bat species, monitor the status of bat populations, and establish conservation measures and BMPs designed to reduce the threat to or destruction of bat habitat. To protect summer roosts and hibernacula from INL-related activities, the BPP established distances in which certain activities are limited, including vegetation removal, herbicide use, and noise.

3.6.3 Impacts to Ecological Resources

3.6.3.1 Vegetation

Soil disturbance associated with the construction of the Proving Ground would result in both direct and indirect impacts on vegetation. Vegetation would be removed from much of the project area. Fragmentation of the remaining plant communities and reduction to the habitat value of those communities is also a direct environmental consequence of soil disturbance. Indirectly, soil disturbance increases the risk of invasion by non-native weeds and may act as a vector for introducing those weeds into adjacent, undisturbed plant communities. Regular traffic and mowing, even in areas not proposed for development, may also lead to the eventual loss of native plant communities and/or the spread of noxious or invasive plant species already present on the Proving Ground (Hansen and Clevenger 2005; Lazaro-Lobo and Ervin 2019).

The direct loss of these plant communities cannot be avoided, but impact can be minimized by reducing soil disturbance as much as feasible while accomplishing project activities. Restricting unnecessary off-road traffic and repetitive mowing would also reduce the direct loss and indirect increase in invasion by weedy annuals on and around the project site. Revegetation of areas that have been disturbed once, but where ongoing disturbance is not needed, would reduce impacts of soil disturbance and risk of invasion. Weed control is also recommended as a mitigation measure, especially on and adjacent to areas where soil disturbance and vegetation removal is recurring.

All methods of direct or indirect vegetation removal and disturbance would cause the reduction of the sagebrush habitat in the Proving Ground project footprint. In the CCA, a general “no net loss” of sagebrush goal has been implemented across the INL Site. To address this goal, the project must implement PRD-407, “Evaluation, Determination, and Implementation of Sagebrush Compensatory Mitigation Commitments.” On an annual basis, the amount of area disturbed would be calculated and inform the cost of sagebrush compensatory mitigation to be carried out to restore beneficial habitat to sage-grouse and other sagebrush obligates in a different location. If mitigation efforts are successful, they would eventually offset sagebrush losses from the development of the Proving Ground. Although the loss of sagebrush habitat would take place within the Proving Ground, there are large tracts of sagebrush steppe (i.e., SGCA, Sagebrush Steppe Ecosystem Reserve [SSER]) that are deprioritized for development across INL, which are intended to conserve large areas at a distance from existing facilities and outside of development areas such as the Proving Ground (DOE-ID and USFWS 2014; DOE-ID and BLM 2004).

Although plant communities with elevated conservation status have the potential to occur throughout the ecological review area, species assemblages documented during site-specific surveys of the Proving Ground footprint did not indicate the presence of these vegetation communities. There are no known impacts to vegetation communities assigned an elevated conservation ranking within the Proving Ground footprint.

There were several special-status plant species observed within the proposed Proving Ground footprint and appropriate habitat for additional special-status plant species in the area. These species would be impacted directly and removed from the landscape through soil disturbance associated with infrastructure development and construction activities. Additionally, indirect impacts include the increased risk of weed invasion in the project area, reducing the habitat quality and creating direct competition for limited resources. Additional populations of these special-status plant species have been documented outside of the project footprint and outside of the INL Site boundary. Within the INL Site, habitat for these species is present within areas that have been deprioritized for development (i.e., SGCA and SSER).

3.6.3.2 Wildlife

During establishment of the Proving Ground, there are sources of potential direct and indirect impacts to wildlife. However, incorporation of institutional controls and other BMPs should minimize or avoid these impacts to the extent practical without jeopardizing project completion. Anticipated impacts and their mitigation measures are discussed below, as well as potential impacts to species of interest.

Sources of Potential Impact

Permanent and temporary loss of habitat is expected for sagebrush and shrubland-associated wildlife species resulting from construction-related ground disturbance and vegetation clearing. Additionally, remaining habitats may be fragmented from Proving Ground development (i.e., line, test pads, and access/construction roads), and adjacent habitats may be degraded from weed invasion. Displacement of individuals of certain wildlife species would occur because of operation-related activities at the cleared area (i.e., equipment, materials, and construction).

Habitat Degradation, Fragmentation, and Loss

Permanent loss of sagebrush habitat is anticipated to be offset by compensatory mitigation efforts discussed in the previous section and by the presence of conservation areas (i.e., SGCA, SSER) that have been deprioritized for development on the INL Site. Additionally, sagebrush habitat is available immediately adjacent to the Proving Ground footprint and can be used by displaced wildlife.

The Proving Ground would be constructed adjacent to existing facilities and support infrastructure at CFA. This would limit fragmentation by reducing the need for new utility corridors and access roads required for construction, maintenance, and operational activities.

Potential degradation of adjacent habitats by weed invasion can be mitigated by implementing measures such as reducing soil disturbance, soil stabilization, revegetation, and weed control discussed in the previous section.

Human-Wildlife Interactions

Impacts may result from human-wildlife interactions during project construction and operation. These include disturbance and direct mortality risk to wildlife from increased motor vehicle activity and increased disturbance to wildlife from interactions with project personnel. Institutional controls and BMPs can avoid or greatly reduce these impacts and include seasonal timing of construction to avoid critical times for wildlife, reduced speed limits on access roads, wildlife exclusion fencing, managing potential wildlife attractants such as disturbed soils and trash, weed management planning, keeping work areas neat, warning signs (to alert personnel as to the presence of wildlife), reflectors, ultrasonic warning whistles on vehicles, and worker awareness programs.

Infrastructure

Impacts from infrastructure to wildlife at the Proving Ground include increased risk of birds colliding with buildings and increased risk of electrocution from powerline structures. Additionally, infrastructure may increase predation pressure on sensitive species in edge habitats from the presence of new elevated perching or nesting areas used by avian predators and new linear features (i.e., roads) that are often used by mammalian predators.

These impacts can be mitigated by ensuring any powerline structures are Avian Powerline Interaction Committee compliant and are engineered to minimize perching and nesting opportunities. Risk of collisions with buildings can be reduced or avoided by using patterned film on large exterior windows, reducing the use of outdoor lights, using shields to direct light beams down to the ground, and minimizing blue light emissions. Engineering controls or using deterrents (e.g., spikes, Bird-X product) would reduce nesting opportunities for birds on buildings and support infrastructure.

Siting of the Proving Ground adjacent to existing facilities and support infrastructure at CFA reduces the need to create new linear features for construction, maintenance, and operational activities.

Potential Impacts to Species of Interest

Sensitive Species

For wildlife, impacts would be considered significant if they resulted in loss of individuals of protected or sensitive species or loss of local populations of wildlife through high levels of direct mortality or diminished survivorship. However, no such impacts were identified.

Pygmy Rabbi

Evidence of pygmy rabbit use was found within the Proving Ground footprint. However, no burrow systems were identified. Impacts on this species are anticipated to be minimal due to the limited disturbance area in relation to habitat needs and the presence of adjacent habitat.

Greater Sage-Grouse

Evidence of sage-grouse use was found within the Proving Ground footprint. While suitable nesting, brood rearing, and wintering habitat is present for this species in the footprint, minimal direct impacts are anticipated due to the limited amount of disturbance planned and the distance from known leks to development areas. Anticipated impacts to this species are potential displacement of individuals and loss of sagebrush habitat.

Pronghorn and Mule Deer

Evidence of both species was found within the Proving Ground footprint. While foraging habitat would be removed, impacts to these species are expected to be minimal due to the limited disturbance footprint with respect to the large home ranges of these species. Additionally, mule deer are frequently observed using landscaping features at CFA and appear to be tolerant to human activity.

Nesting Birds

Habitat for sagebrush-obligate and shrubland/grassland-associated species would be removed. Five sensitive species (Brewer's sparrow, common nighthawk, loggerhead shrike, sage thrasher, and sagebrush sparrow) and many common species were observed or were believed to be nesting in the Proving Ground footprint. Impacts to these species are expected to be minimal due to the presence of adjacent habitat.

Additionally, the Migratory Bird Treaty Act of 1918 protects migratory birds, their nests, and eggs. If any activity having the potential to disturb nests, including vegetation removal and construction activities, is to occur between April 1 and October 1, a nesting bird survey would need to be conducted before the activity begins. Work may be delayed or work limits may be imposed if nests are discovered.

Bats: Six species of bats were detected within the Proving Ground footprint. Impacts to bats are anticipated to be minimal as no roosting or maternity features would be removed or disturbed and no wind energy infrastructure would be installed.

Pollinators

Vegetation removal, ground disturbance, and soil compaction would remove habitat for these species. However, impacts are anticipated to be minimal due to the presence of adjacent habitats, implementation of measures to control weeds, and use of native seed to revegetate temporarily disturbed areas. Additionally, it is unlikely that western bumblebees are present in the area, as their population range estimates have been reduced in recent decades and appear to be limited to higher elevation meadows. Although Morrison's bumblebee and Suckley's cuckoo bumblebee were not detected in the Proving Ground, they may be present. However, little is known about the true distributions or local population sizes of these species.

Under the No Action Alternative, impacts on ecological resources from current INL activities would remain the same. Risk of weed spread and the impacts of habitat loss and fragmentation associated with current infrastructure and INL operations would remain unchanged.

3.7 Cultural Resources

3.7.1 Affected Environment

The affected environment for cultural resources (archaeological and built environment) includes the construction of infrastructure and facilities for the Proving Ground. Cultural resources are protected under the National Historic Preservation Act of 1966, as amended (54 U.S.C. §300101 et seq.), and its implementing regulations at 36 CFR Part 800. Federal agencies must consider both **direct and indirect effects** of undertakings on historic properties listed in or eligible for listing in the National Register of Historic Places (NRHP). The Advisory Council on Historic Preservation defines direct effects as those "…that come from the undertaking at the same time and place with no intervening cause, it is considered direct regardless of its specific type (e.g., whether it is visual, physical, auditory, etc.)" (ACHP 2019) and are immediate. Indirect effects are those, "…that are later in time or farther removed in distance but are still reasonably foreseeable" (ACHP 2019) or cumulative. Under 36 CFR §800.5(a)(1), an undertaking may have an adverse effect, directly or indirectly, if it alters characteristics of a historic property that qualify it for inclusion in the NRHP. Adverse effects may include direct physical destruction, alteration of setting, introduction of visual elements that diminish integrity, or changes to the property's historic character or use.

The following Archaeological and Built Environment Assessments pertain to the Proposed Action (see Section 2.1) inside of the 383-acre Proving Ground boundary (see Section 3.6.2.1) and the No Action Alternative (see Section 2.2). A brief assessment of the proposed MPS Testbed to be built inside the Proving Ground boundary is provided in Section 3.6.2.2.

3.7.1.1 Archaeological Resources

In 2025, the INL Cultural Resource Management Office conducted background research and intensive cultural resource inventories necessary to identify and characterize cultural resources within the Proving Ground development area (383 acres). This background research and intensive inventory identified 23 archaeological resources, of which three are historic properties eligible for the NRHP under Criterion D as they have the potential to yield information important to understanding history. The Idaho State Historic Preservation Office (SHPO) concurred with these eligibility recommendations in July 2021 (2021-775; ISHS 2021) and March 2026 (2026-461; ISHS 2026). Table 6 shows the information for the 23 identified sites.

Table 6. Identified archaeological resources.

Site No.	Site Type	NRHP Eligibility/Criteria
10BT096	Precontact Artifact Scatter	Not Eligible
10BT1202	Precontact Artifact Scatter	Not Eligible
10BT1191	Precontact Artifact Scatter	Not Eligible
10BT100	Precontact Artifacts	Not Eligible
10BT1193	Precontact Lithic Scatter	Not Eligible
10BT3854	Precontact Lithic Scatter	Not Eligible
10BT1194	Precontact Artifact Scatter	Not Eligible
10BT104	Precontact Artifact Scatter	Eligible/D
10BT2541	Precontact Artifact Scatter	Eligible/D
10BT2542	Precontact Feature and Artifacts	Eligible/D

Site No.	Site Type	NRHP Eligibility/Criteria
10BT1192	Precontact Artifacts	Not Eligible
10BT2540	Precontact Lithic Scatter	Not Eligible
10BT2771	Historic canal headgate	Not Eligible
10BT2544	Precontact Artifact Scatter	Not Eligible
10BT3419	Historic Canal	Not Eligible
Isolated Finds		
BEA-20-17-IS23	Precontact artifacts	Not Eligible
10BT1203	Precontact artifact	Not Eligible
10BT1729	Precontact artifact	Not Eligible
10BT1730	Precontact artifact	Not Eligible
BEA-20-17-IS21	Precontact artifact	Not Eligible
BEA-25-053-02	Precontact Artifact	Not Eligible
BEA-25-053-03	Precontact Artifact	Not Eligible
BEA-25-053-04	Precontact Artifact Scatter	Not Eligible

3.7.1.2 Built Environment Resources

While there are no built environment historic properties within the proposed Proving Ground development area, the historic properties shown in Table 7 (2022-556; ISHS SHPO 2023; Mead and Hunt 2019) are adjacent to it.

Table 7. Built environment resources adjacent to the Proving Ground.

Building ID	Building Name	Construction Date	Eligibility
CF-633/CF-704	Concussion Wall	1942	Eligible
CF-651/CF-719	Pump House	1943	Eligible
CF-642/CF-720	Pump House	1943	Eligible
EBR-I-601	EBR-I	1951	Listed
EBR-I-602	EBR-I Guardhouse	1950	Listed
None	Locomotive	1954	Eligible
None	HTRE-1 and 2	1955	Eligible
None	HTRE-3	1958	Eligible
N/A	EBR-I Historic Site	1949–1970	Eligible
N/A	Highway 20	1940	Eligible

3.7.2 Impacts to Cultural Resources

Activities developed as part of the Proposed Action (see Section 2.1) have the potential to result in direct (e.g., immediate) and indirect (e.g., cumulative, reasonably foreseeable) effects on archaeological historic properties within the Area of Potential Effect, as well as the surrounding built environment historic properties. Site preparation and development activities associated with the Proving Ground have not been initiated at this time. Only the MPS Testbed has been developed to date (see Section 3.6.2.2). However, additional infrastructure, facility, and building designs have not been finalized and would be developed in phases.

3.7.3 Proposed Action – Energy Technology Proving Ground

3.7.3.1 Archaeological Resources

Under the Proposed Action, there are three archaeological historic properties located inside the proposed development boundary of the Proving Ground, as described in Section 3.6.1. All three are precontact period properties that are eligible for the NRHP under Criterion D. The construction and installation of utility infrastructure, including roads, power distribution lines, substations, and construction of general-purpose facilities, has potential to directly affect these historic properties as a result of construction activities, thereby altering critical aspects of integrity.

Indirect effects to NRHP-eligible archaeological historical properties are reasonably foreseeable as a loss to the integrity of materials, association, location, and workmanship. These impacts can alter critical characteristics of an archaeological historic property that are necessary for the property to convey its significance for the NRHP under Criterion D. Impacts to NRHP-eligible archaeological historic properties cannot be evaluated until more complete designs and development plans for the Proving Ground are provided.

3.7.3.2 Built Environment Resources

Under the Proposed Action, there are no built environment historic properties (buildings or structures) within the proposed development boundary of the Proving Ground; however, as described in Section 3.6.1, 10 historic properties, including the National Historic Landmark Experimental Breeder Reactor I (EBR-I), three historic objects, three historic buildings, one historic structure, one historic linear resource, and one historic site, have the potential to be affected (directly or indirectly) by the Proposed Action. These historic properties are visible from the Proving Ground area, and any development would be visible to these historic resources. The construction and installation of utility infrastructure, including roads, power distribution lines, substations, and construction of general-purpose facilities, have the potential to directly affect a historic property's integrity through introduction of visual impacts. Activation of a previously undeveloped area has the potential to introduce auditory and atmospheric effects to these historic properties as well.

Indirect effects, resulting from the Proposed Action and any actions that may arise as plans for the Proving Ground are further developed, are foreseeable as a loss to the integrity of setting, feeling, and association with the introduction of new visual, auditory, or atmospheric elements on the landscape. Direct and indirect effects on the built environment's historic properties cannot be evaluated until more complete designs and development plans for the Proving Ground are provided. A viewshed analysis would be necessary to determine the visual impacts on historic properties.

3.7.3.3 Summary of Effect – Energy Technology Proving Ground

- Under the Proposed Action Alternative, Cultural Resource Management Office would review Proving Ground infrastructure and facility designs as they are proposed.
- A phased Section 106 approach would be used for individual projects to adequately evaluate any effects (direct and indirect) on historic properties (archaeological and built environment).
- Treatment plans and agreement documents (e.g., Memorandum of Agreement or Programmatic Agreement) for the projects would be developed, when determined necessary, in consultation with the Idaho SHPO, Shoshone-Bannock Tribes, and other interested consulting parties to avoid, minimize, or mitigate any adverse effects to these properties.
- Future project-specific activities that may utilize Proving Ground infrastructure or facilities would be subject to separate Section 106 review prior to implementation.
- Direct and indirect effects to historic properties would be evaluated as future project-specific activities are proposed.

3.7.3.4 Proposed Modular Power Systems Testbed

Archaeological Resources

Sufficient scope has been developed to evaluate impacts (direct and indirect) for one set of improvements proposed for the Proving Ground. The 43.76-acre MPS Testbed (see Section 2.1) is proposed to be built in the southeast corner of the Proving Ground (calculated using INL's standard 200-ft buffer surrounding the power lines area needed for construction and maintenance purposes). No archaeological historic properties are located inside the portion of the Proving Ground that would have direct ground disturbance from construction of the MPS Testbed. All archaeological historic properties within the viewshed are precontact sites eligible under Criterion D, and aspects of integrity necessary for these sites to convey their significance would not be diminished or altered by construction activities for the proposed MPS Testbed.

Built Environment Resources

Sufficient scope has been developed to evaluate impacts (direct and indirect) for one set of improvements proposed for the Proving Ground. The 43.76-acre MPS Testbed (see Section 2.1) is proposed to be built in the southeast corner of the Proving Ground. A cultural review assessed potential direct and indirect effects to built environment historic properties from construction of the testbed, which includes seventeen 90-ft power poles of wood or steel, a gravel pad, and fences, as well as the temporary placement of a mobile substation, a mobile skid, and other equipment. Given the height of the power poles (90 ft) and their location, the power poles were buffered by 1 mile to identify the largest visual extent of the testbed. Within this 1-mile area, there are four historic properties, Highway 20, CF-633, CF-651, and CF-642.

The installation of the MPS Testbed has the potential to cause visual effects to Highway 20 and CF-633. However, given that the testbed primarily consists of power poles, which are commonly found along Highway 20, and given that CF-633, CF-651, and CF-642 no longer retain integrity of setting, this activity would not directly affect built environment historic properties.

Indirect effects include the reasonably foreseeable future expansion or permanent additions to the MPS Testbed, which would require additional cultural review to determine effects (direct and indirect) to built environment historic properties.

3.7.3.5 Summary of Effect – Modular Power Systems Testbed

- Construction of the MPS Testbed would have no direct or indirect effects on archaeological historic properties with the condition that the scope and location of the proposed infrastructure do not change.
- Construction of the MPS Testbed would have no direct effects on built environment historic properties with the condition that the scope and location of the proposed infrastructure do not change.
- Future development of the MPS Testbed (expansion or additions) would be subject to separate Section 106 review prior to implementation.

Under the No Action Alternative, DOE would not develop the Proving Ground infrastructure or facilities or the MPS Testbed. Existing historic properties (archaeological and built environment) would remain subject to only ongoing INL operations and natural processes.

3.8 Waste Management

Waste generated at INL is managed under established federal, state, and DOE requirements. Waste streams associated with routine INL operations include non-hazardous solid waste, hazardous waste, and in designated facilities radioactive waste. Waste management at INL is conducted through existing programs, procedures, and permitted facilities designed to ensure proper handling, storage, transportation, and disposal.

Construction, facility development, and infrastructure maintenance activities at INL typically generate non-hazardous construction debris, packaging materials, scrap metal, and limited quantities of hazardous materials such as used oils or solvents. These waste streams are managed through established INL waste management systems and disposal pathways.

The area proposed for development of the Proving Ground is subject to the same waste management framework and institutional controls as the rest of the INL Site. Existing waste management infrastructure and procedures can manage waste streams associated with construction, maintenance, and general-purpose facility operations typical of INL activities. These conditions represent the baseline against which potential impacts of the Proposed Action are evaluated. The average annual sitewide generation rate at the INL for industrial, universal, and hazardous waste, and hazardous recyclables from 2023 through 2025 was approximately 16,600 cubic feet.

3.8.1 Representative Facility Types

The analysis of waste management considers the types and quantities of waste expected to be generated from the construction and operation of representative Proving Ground facility types, as well as the capacity of existing INL waste management systems to handle these materials. Waste streams evaluated include industrial, hazardous, universal, and recyclable materials. Projections are based on scaling from comparable INL facilities to establish a conservative, but realistic, estimate of potential increases. This approach is intended to bound impacts in the absence of final design details while still grounding the analysis in demonstrated operational data. As shown through analogous facility performance, anticipated increases in waste generation are incremental and remain within existing system capacity, indicating that waste management impacts are expected to be minimal under the Proposed Action. A separate analysis would be completed for each facility once funding and scope have been established. The subsequent analysis would include waste management.

3.8.1.1 Energy Systems Research and Testing Facilities

Energy systems research and testing facilities would support development, integration, and evaluation of advanced energy technologies and integrated energy applications. These facilities may include enclosed structures and outdoor test areas designed to accommodate pilot-scale or demonstration-scale systems and supporting equipment. Buildings would generally consist of industrial-type structures or high-bay spaces and may range from approximately 100,000–150,000 square feet.

The INL Energy Innovation Laboratory (EIL) is an equivalent facility to the Energy Systems Research and Testing Facilities. The facility would result in a 2.49% sitewide increase in industrial, universal, and hazardous waste, and hazardous recyclables, which is within the capacity of INL's existing waste management systems. No radioactive or mixed waste generation volume estimates are provided since the ETPG EA excludes facilities generating radioactive or mixed waste. Therefore, no waste management impacts are expected for this facility type.

3.8.1.2 Materials Development and Processing Facilities

Materials development and processing facilities would support research, fabrication, and evaluation of materials used in advanced energy systems and related applications. These facilities may include laboratory space, light industrial areas, and high-bay processing areas designed to accommodate a variety of material preparation, handling, and testing activities. Buildings would typically be industrial- or laboratory-type structures and may range from approximately 50,000–100,000 square feet.

The INL Manufacturing and Assembly Building (SMC) is an equivalent facility to the Materials Development and Processing Facilities. The facility would result in a 7.46% sitewide increase in industrial, universal, and hazardous waste, and hazardous recyclables, which is within the capacity of INL's existing waste management systems. No radioactive or mixed waste generation volume estimates are provided since the ETPG EA excludes facilities generating radioactive or mixed waste. Therefore, no waste management impacts are expected for this facility type.

3.8.1.3 Laboratory and Analytical Facilities

Laboratory and analytical facilities would support scientific research, testing, and characterization activities. These facilities may include wet and dry laboratories, instrumentation space, and associated support areas. Laboratory facilities would generally be enclosed buildings designed to support a range of analytical and experimental functions and may range from approximately 25,000–75,000 square feet.

The INL Research Center Laboratory Building is an equivalent facility to the Laboratory and Analytical Facilities. The facility would result in a 3.59% sitewide increase in industrial, universal, and hazardous waste, and hazardous recyclables, which is within the capacity of INL's existing waste management systems. No radioactive or mixed waste generation volume estimates are provided since the ETPG EA excludes facilities generating radioactive or mixed waste. Therefore, no waste management impacts are expected for this facility type.

3.8.1.4 High-Bay and Test Support Facilities

High-bay and test support facilities would provide flexible indoor space for assembly, staging, integration, and testing of equipment and systems. These facilities may include large, open-floor areas, overhead lifting capability, and support infrastructure for handling equipment and materials. Structures would typically be industrial buildings and may range from approximately 75,000–120,000 square feet.

The INL Energy Systems Laboratory (ESL) is an equivalent facility to the High-Bay and Test Support Facilities. The facility would result in a 0.55% sitewide increase in industrial, universal, and hazardous waste, and hazardous recyclables, which is within the capacity of INL's existing waste-management systems. No radioactive or mixed waste generation estimates are provided since the ETPG EA excludes facilities generating radioactive or mixed waste. Therefore, no waste management impacts are expected for this facility type.

3.8.1.5 Support and Administrative Facilities

Support and administrative facilities would provide office space, control rooms, maintenance areas, storage, and other functions necessary to support Proving Ground operations. These facilities may include administrative buildings, maintenance shops, warehouses, and utility support structures. Building sizes may vary widely depending on function but would generally range from approximately 25,000–50,000 square feet.

The INL Willow Creek Building is an equivalent facility to the Support and Administrative Facilities. The facility would result in a 0.61% sitewide increase in industrial, universal, and hazardous waste, and hazardous recyclables, which are within the capacity of INL's existing waste management systems. No radioactive or mixed waste generation estimates are provided since the ETPG EA excludes facilities generating radioactive or mixed waste. Therefore, no waste management impacts are expected for this facility type.

3.8.1.6 Conclusion

Waste generation and recycling for each representative facility type was estimated using equivalent INL facilities shown in Table 8. In all cases, projected increases in waste and recycling (ranging from 0.55–7.46% sitewide) remain within the capacity of existing INL waste management systems (see Table 8).

Table 8. Percent increase by waste type and recycling.

Proving Ground Facility Type	Equivalent INL Facility	Equivalent INL Facility Annual Hazardous Recycling and Waste Generation (cubic feet)
Energy Systems Research and Testing Facilities	INL Energy Innovation Laboratory (REC-688)	412.48
High-Bay and Test Support Facilities	INL Energy Systems Laboratory (REC-685)	91.01
Laboratory and Analytical Facilities	INL Research Center Laboratory Building (REC-603)	596.01
Materials Development and Processing Facilities	INL Specific Manufacturing Capability (SMC) Manufacturing and Assembly Building (TAN-679)	1,237.89
Support and Administrative Facilities	Willow Creek Building (IF-616)	101.92
Total		2,439.31

INL ships 587 4×4×6 boxes each year; this change would increase that total by about 4.7% or add about three additional cargo containers. As a result, waste management impacts are expected to be minimal for each facility type.

3.8.2 Impacts to Waste Management

Development of enabling infrastructure and research and support facilities associated with the Proving Ground would generate typical construction, facility development, and maintenance-related waste. These wastes may include soil and debris from site preparation, construction debris, packaging materials, scrap metal, and minor quantities of maintenance-related wastes. Waste generation would occur intermittently and in phases, consistent with the phased development of infrastructure and facilities within the Proving Ground footprint.

Such waste would be managed using existing INL waste management procedures and permitted disposal facilities in compliance with applicable federal, state, and DOE requirements. The types of waste generated would be consistent with those currently managed at the INL Site and would not introduce new waste streams or require new waste management capabilities.

Construction and operation of the MPS Testbed would generate minor quantities of construction debris and maintenance-related waste, which would be managed in accordance with existing INL waste management procedures and within the capacity of current waste management systems.

In the context of existing and reasonably foreseeable activities at the INL Site, waste generated from construction, facility development, and maintenance associated with the Proving Ground would represent a small increment relative to ongoing Site waste generation. Because these wastes would be managed within existing regulatory frameworks and institutional controls, cumulative impacts to waste management systems are expected to be negligible.

Under the No Action Alternative, no additional construction- or facility-related waste associated with the Proving Ground would be generated, and waste generation would remain consistent with current INL operations.

3.9 Transportation

Transportation infrastructure serving INL includes a network of internal access roads, designated arterial routes, and connections to U.S. and state highways. Public access to the INL Site is limited to designated highways that traverse portions of the Site, while most internal roadways are access-controlled and used primarily for laboratory operations and support activities.

Traffic within operational areas of the INL Site consists primarily of employee commuter vehicles, bus operations to transport INL employees to and from INL facilities, delivery and service vehicles, maintenance equipment, and other vehicles associated with research, facility operations, construction, and support functions. Traffic volumes fluctuate depending on operational schedules and ongoing construction or maintenance activities. Existing roadway infrastructure is designed to accommodate routine operational traffic as well as periodic increases associated with construction and Site development activities.

The area identified for development of the Proving Ground is located within an established operational area of the INL Site and is served by existing access roads and transportation infrastructure. These conditions represent the baseline against which potential impacts of the Proposed Action are evaluated.

3.9.1 Impacts to Traffic and Transportation

Development of enabling infrastructure and research and support facilities associated with the Proving Ground would result in temporary increases in vehicle traffic during construction activities. Construction-related traffic would include delivery of materials, movement of construction equipment, and worker commuting. These increases would be intermittent and limited to the duration of construction phases.

Construction traffic would utilize existing INL roadways and access points and would be managed through established INL traffic control and safety procedures. The scale of construction activity associated with infrastructure and facility development is not expected to exceed the capacity of existing internal transportation networks or require modification of external site access points.

Operation and maintenance of Proving Ground infrastructure, facilities, and MPS Testbed would generate additional traffic associated with personnel, deliveries, maintenance activities, and general facility support. Traffic volumes would be consistent with those associated with general-purpose research and industrial support facilities at INL. Because the Proposed Action does not define specific facility operations or large-scale industrial activities, long-term traffic increases are expected to be moderate and within the capacity of existing transportation infrastructure.

In the context of ongoing and reasonably foreseeable activities at the INL Site, temporary construction traffic and incremental operational traffic associated with the Proposed Action would represent a small increase relative to overall Site traffic volumes. Existing transportation infrastructure is expected to accommodate these increases without measurable degradation of roadway performance or safety. Accordingly, cumulative impacts to transportation are expected to be minor.

Under the No Action Alternative, no additional construction- or facility-related traffic associated with the Proving Ground would occur, and traffic patterns would remain consistent with existing INL operations.

3.10 Utilities and Infrastructure

Development of the Proving Ground would include installation, extension, and connection of utility and support infrastructure within the defined 383-acre footprint. Enabling infrastructure would be designed to integrate with existing INL systems and would support phased and incremental development

within the Proving Ground boundary. Infrastructure components may include potable water distribution systems, irrigation systems, sanitary sewer systems (including potential lift stations), natural gas distribution, electrical distribution systems (including conduits, duct banks, vaults, switches, and service connections), and communications infrastructure such as fiber optic and telecommunications lines. Modifications to existing substations or construction of new substation infrastructure may occur, as needed, to support infrastructure distribution.

Utility infrastructure would be developed in a manner consistent with established INL engineering standards and site planning processes. Where practicable, utility extensions would follow or parallel existing corridors within operational areas to minimize new disturbance and maintain compatibility with existing infrastructure networks.

Electrical service to the Proving Ground would be provided through extensions of existing INL transmission and distribution systems. Water supply and sanitary service connections would be tied into existing INL infrastructure where available. Stormwater management features would be implemented consistently with INL environmental procedures and applicable regulatory requirements to manage runoff associated with disturbed areas and new impervious surfaces.

Utility and infrastructure development would occur incrementally and in phases based on funding availability and mission needs. All installations would remain within the evaluated footprint and would be constructed in accordance with applicable DOE and INL safety, environmental protection, and engineering requirements. The Proposed Action does not authorize installation of power generation facilities, energy conversion systems, or other technology-specific utility systems.

The MPS Testbed would require connection to existing electrical distribution infrastructure and may include installation of localized utility components such as power poles, distribution lines, and associated equipment; these elements would be integrated into existing INL utility systems and managed within current infrastructure capacity.

The INL Site is supported by established utility and infrastructure systems that provide electrical power, communications, potable water, fire-protection water, sanitary sewer, and other facility support services. These systems are designed to support ongoing operations across multiple Site facilities and are managed under established regulatory and institutional frameworks.

The area identified for developing the Proving Ground is located adjacent to an operational area served by existing utility corridors and infrastructure networks. These systems represent the baseline conditions against which potential impacts of the Proposed Action are evaluated.

3.10.1 Impacts to Utilities and Infrastructure

Development of enabling infrastructure associated with the Proving Ground would require a connection to existing INL utility systems, including electrical distribution, communications, and water service. Construction activities would include an extension of utility lines and installation of supporting infrastructure within the defined project area. These activities would occur within existing operational areas and would be designed to integrate with established site systems.

Infrastructure development would result in incremental increases in utility use associated with construction and maintenance activities.

Existing INL utility systems are expected to support the development of the Proving Ground through a combination of the existing service capacity, utility extensions, and associated infrastructure improvements. Utility extensions, modifications, and expansions would be implemented in accordance with established INL engineering, safety, and environmental procedures. These actions may include new power and water distribution lines, supporting utility infrastructure, and substation-related improvements needed to serve Proving Ground infrastructure and facilities, and would occur through normal site planning and infrastructure management processes.

In the context of ongoing and reasonably foreseeable activities at the INL Site, incremental utility demand associated with the Proposed Action would represent a small contribution relative to overall Site utility usage. Because utility development would occur within existing systems and under established regulatory and institutional controls, cumulative impacts to utilities and infrastructure are expected to be negligible.

Under the No Action Alternative, no additional utility connections or extensions associated with Proving Ground infrastructure would occur. Utility demand would remain consistent with current Site conditions.

3.11 Worker Health and Safety

Worker health and safety at INL is managed under established DOE requirements, Occupational Safety and Health Administration (OSHA) standards, and site-specific safety programs. INL maintains comprehensive safety management systems that address construction activities, facility operations, infrastructure maintenance, hazardous material handling, emergency preparedness, and occupational health.

Existing INL operations involve a range of industrial, laboratory, facility, and construction activities typical of a large federal research facility. Worker safety performance is monitored and managed through institutional controls, training requirements, hazard analysis processes, and emergency response procedures. These existing safety programs represent the baseline conditions against which potential impacts of the Proposed Action are evaluated.

Construction of the MPS Testbed would involve typical occupational hazards associated with earthwork, equipment operation, and material placement. These activities would be conducted in accordance with established safety procedures, including OSHA requirements and site-specific safety programs. No unique or unusual construction hazards are anticipated.

Operation of the MPS Testbed would involve energized electrical systems, high-current testing, and mechanical testing activities. These activities present inherent hazards, including electrical shock, arc flash, and equipment-related risks. However, testing would be conducted under controlled conditions using established engineering controls, administrative procedures, and trained personnel.

3.11.1 Impacts to Worker Health and Safety

Development of enabling infrastructure and research and support facilities associated with the Proving Ground would involve construction activities such as grading, excavation, utility installation, building construction, and development of access roads and general-purpose pads. These activities present occupational hazards typical of construction projects, including equipment operation, elevated work, material handling, and potential exposure to environmental conditions. Such hazards would be managed through established INL construction safety programs, work control processes, and compliance with applicable OSHA and DOE requirements.

Operation and maintenance of Proving Ground infrastructure and facilities would involve activities similar to those currently conducted at INL, including facility operations, inspections, maintenance tasks, material handling, and support services. These activities may involve industrial and laboratory hazards

typical of research and support facilities; however, such hazards are routinely managed under existing INL safety management systems. Because specific facility designs, processes, and operations have not been defined, detailed hazard characterization is not provided in this EA.

Construction, operation, and maintenance activities associated with the Proposed Action would occur within an established operational environment where worker safety is governed by existing institutional controls and safety management systems. The scale and nature of these activities are consistent with ongoing INL operations and are not expected to result in a measurable change in overall worker risk.

The MPS Testbed would not support high-hazard operations such as explosives testing, open detonation, or activities requiring specialized hazard classifications beyond those already managed within existing Site programs. Much of the testing activities would be intermittent and short in duration, further limiting exposure potential.

Because this work occurs within ORD-3, there is the potential for unearthing UXO; personnel will follow the applicable Munitions Response Area Activity Notification, which outlines procedures for working within a UXO area.

In the context of ongoing and reasonably foreseeable activities at the INL Site, construction, operation, and maintenance associated with Proving Ground infrastructure and facilities would represent a small increment relative to overall Site activities. Because these activities would be conducted under established safety management systems and regulatory requirements, cumulative impacts to worker health and safety are expected to be minor.

Compliance with applicable safety standards, including OSHA regulations and site-specific safety protocols, would ensure that risks to workers are minimized. No disproportionate or unmanageable risks to worker health and safety are anticipated.

Under the No Action Alternative, no additional construction- or facility-related activities associated with the Proving Ground would occur, and worker safety conditions would remain consistent with existing INL operations.

3.12 Conclusion

The analysis presented in this EA evaluates the potential environmental impacts associated with the development of enabling infrastructure and representative research and support facilities within the Proving Ground footprint. Based on this analysis, implementation of the Proposed Action would result in small, localized adverse impacts that would not exceed applicable regulatory limits or standards, exceed the capacity of affected resources, or moderately exceed the capability of existing infrastructure and utility systems to provide services. These moderate changes will still be evaluate in the future.

Impacts associated with construction, operation, and maintenance of infrastructure and facilities would be managed through compliance with applicable regulations, permits, and agreements, as well as through implementation of design features and BMPs. No mitigation measures beyond those required under existing regulatory and institutional frameworks have been identified as necessary.

When considered in combination with other past, present, and reasonably foreseeable future actions at the INL Site, impacts associated with the Proposed Action would not result in significant cumulative effects. Impacts would be incremental, bound within the evaluated footprint, and consistent with ongoing Site activities. Cumulative effects on built environment and archaeological historic properties cannot be fully determined until more complete designs and development plans are available. Those effects would be evaluated through the phased Section 106 process before individual projects are implemented.

Future project-specific actions that may be proposed within the Proving Ground would be subject to separate planning, environmental review, and decision-making, as appropriate.

Table 9 summarizes the anticipated environmental impacts associated with the development of the Proving Ground as described in this EA.

Based on the analysis presented in this EA, the Proposed Action would not significantly affect the quality of the human environment.

Table 9. Summary of environmental impacts from the Proving Ground.

Resource	Impacts from the Proving Ground
Air	Construction of the Proving Ground would produce air emissions from construction equipment exhaust and fugitive dust from site preparation and ground disturbance, resulting in small, temporary impacts to air quality. During operation, the Proving Ground would not introduce major stationary emission sources, and routine activities and intermittent test pad operations would generate only minor emissions, resulting in negligible impacts to air quality. All emissions would be managed under existing INL permitting requirements and would not result in exceedances of applicable standards. Construction and operations would not contribute to cumulative impacts on air quality.
Water Resources	Development of the Proving Ground would involve ground-disturbing activities that could temporarily increase soil erosion and sediment transport during construction, resulting in small, localized, and temporary impacts to water resources. These effects would be minimized through implementation of standard erosion and sediment control best management practices and compliance with applicable stormwater permitting requirements. Operation and maintenance of Proving Ground infrastructure would not be expected to affect groundwater or surface water resources beyond existing conditions, and impacts would be minor. Construction and operations would not contribute to cumulative impacts on water resources.
Geology and Soils	Development of the Proving Ground would result in disturbance of soils from grading, excavation, utility installation, and construction activities, resulting in small, localized impacts to geology and soils. These activities may temporarily increase soil compaction, erosion, and sediment transport; however, impacts would be minimized through implementation of best management practices and would be limited to the construction period. Operation of the Proving Ground would involve minimal additional soil disturbance and would not affect regional geologic conditions. Construction and operations would not contribute to cumulative impacts on geology and soils.
Ecological Resources	Construction of the Proving Ground would result in removal of vegetation, habitat loss, and fragmentation, and could introduce invasive species, resulting in localized impacts to ecological resources. These effects would be minimized through implementation of best management practices, mitigation measures such as revegetation and weed control, and adherence to existing conservation programs. Impacts to wildlife would be greatest during the construction period but would be minimized through the phased construction approach. Operation of the Proving Ground would result in continued, but minor, disturbance to any wildlife remaining in the area due to human activity and infrastructure. Overall impacts to wildlife populations would be minimal due to the presence of adjacent habitat and existing site conditions. Construction and operations would not contribute to cumulative impacts on ecological resources across the INL Site.

Resource	Impacts from the Proving Ground
Cultural Resources	Development of the Proving Ground has the potential to result in direct and indirect effects to archaeological and built environment historic properties from ground disturbance and introduction of visual, auditory, and atmospheric elements, resulting in potential impacts to cultural resources. Because facility designs and development plans have not been finalized, the extent of impacts cannot be fully determined at this time. A phased Section 106 approach would be implemented, and project-specific reviews, consultation, and mitigation measures would be conducted to avoid, minimize, or mitigate adverse effects. Cumulative effects on built environment and archaeological historic properties would be evaluated through the phased Section 106 process as designs are developed.
Waste Management	Construction and development of the Proving Ground would generate typical construction debris, packaging materials, scrap metal, and minor quantities of maintenance-related waste, resulting in small, temporary impacts to waste management. During operation, waste generation from representative facility types would result in incremental increases that remain within the capacity of existing INL waste management systems, and impacts would be minimal. All waste would be managed in accordance with existing regulatory requirements and institutional controls, and no new waste streams would be introduced. Construction and operations would not contribute to cumulative impacts on waste management.
Transportation	Construction of the Proving Ground would result in temporary increases in traffic from construction equipment, material deliveries, and worker commuting, resulting in small, intermittent impacts to transportation. These activities would utilize existing INL roadways and would be managed under established traffic control procedures. During operation, traffic associated with personnel, deliveries, and maintenance would be consistent with existing INL activities and would result in minor impacts to transportation. Construction and operations would not contribute to cumulative impacts on transportation.
Utilities and Infrastructure	Development of the Proving Ground would require extension and connection of utilities, including electrical, water, communications, and supporting infrastructure, resulting in small, localized impacts during construction. These activities would occur within existing operational areas and would be integrated with established INL systems. During operation, utility use associated with infrastructure and maintenance would result in incremental increases that would be supported by existing capacity and planned system improvements, resulting in minor impacts. Construction and operations would not contribute to cumulative impacts on utilities and infrastructure.
Worker Health and Safety	Construction of the Proving Ground would involve typical occupational hazards associated with equipment operation, material handling, and site development, resulting in small, temporary impacts to worker health and safety. These activities would be conducted in accordance with established safety programs, procedures, and regulatory requirements. During operation, activities would be consistent with existing INL operations and would be managed under existing safety management systems, resulting in minimal impacts. Construction and operations would not contribute to cumulative impacts on worker health and safety.

Resource	Impacts from the Proving Ground
Conclusion	Development of the Proving Ground would result in small, localized, and temporary impacts to environmental resources that would not exceed regulatory limits or standards or the capacity of existing infrastructure and services. Impacts associated with construction and operation would be managed through compliance with applicable regulations, permits, and established best management practices, and no additional mitigation measures are required with the exception of the mitigation measures identified in certain resource sections. Construction and operations would not contribute to cumulative impacts, and overall impacts would not be significant.

4. COORDINATION AND CONSULTATION

4.1 Shoshone-Bannock Tribes

DOE provided the EA to the Shoshone-Bannock Tribes Department of Energy staff and Fort Hall Business Council for a 30-day review period.

4.2 State of Idaho

DOE provided the EA to the Idaho Governor's Office of Energy and Mineral Resources for a 30-day review period.

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